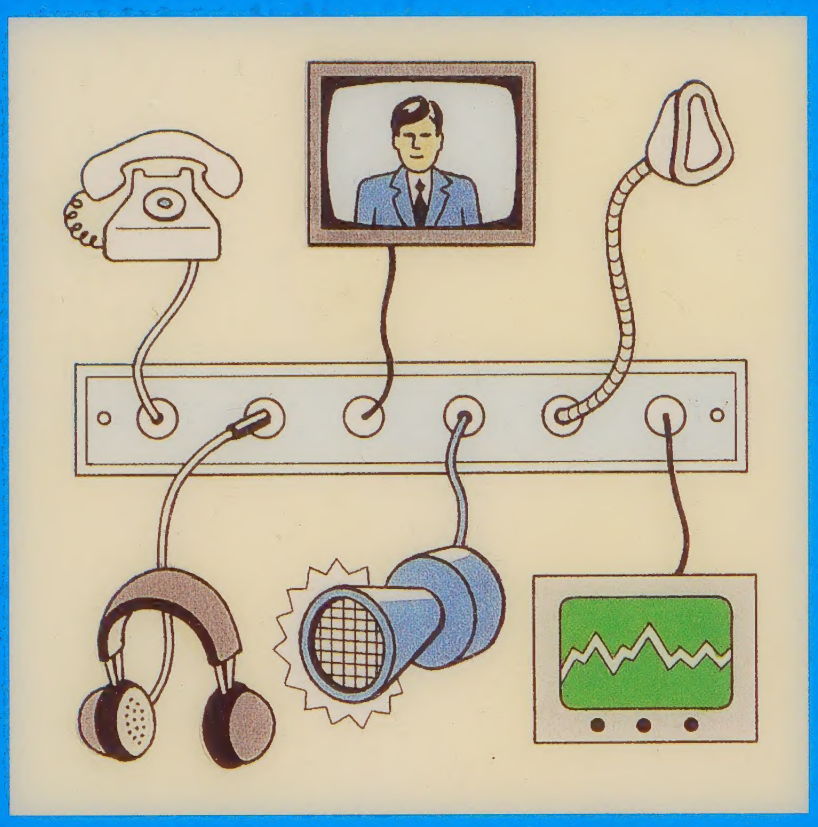
MC0196

Health Technical Memorandum 2015

Health Technical Memorandum 2015

Design considerations

Bedhead services



725.
51
GRE

UK Health Departments

NHS Estates
An Executive Agency of the Department of Health

SOUTH BANK UNIVERSITY LIBRARY
WANDSWORTH ROAD SITE TEL: 071-928 8989
WANDSWORTH ROAD
LONDON SW8 2JZ
This book is due for return not later than the last date shown below.

withdrawn and sold to

Digitized by the Internet Archive
in 2025 with funding from
UCL Library Special Collections

https://archive.org/details/ucl_mc0196

Health Technical Memorandum 2015

Design considerations

Bedhead services

London: HMSO

LONDON SOUTH BANK
UNIVERSITY LIBRARY
WITHDRAWN FROM STOCK

30102 00567868 3

NHS Estates
An Executive Agency of the Department of Health

© Crown copyright 1995
Applications for reproduction should be made to HMSO
First published 1995

ISBN 0 11 321771 4

HMSO
Standing order service

Placing a standing order with HMSO BOOKS enables a customer to receive future titles in this series automatically as published. This saves the time, trouble and expense of placing individual orders and avoids the problem of knowing when to do so. For details please write to HMSO BOOKS (PC 13A/1), Publications Centre, PO Box 276, London SW8 5DT quoting reference 14.02.017.
The standing order service also enables customers to receive automatically as published all material of their choice which additionally saves extensive catalogue research. The scope and selectivity of the service has been extended by new techniques, and there are more than 3,500 classifications to choose from. A special leaflet describing the service in detail may be obtained on request.

About this publication

Health Technical Memoranda (HTMs) give comprehensive advice and guidance on the design, installation and operation of specialised building and engineering technology used in the delivery of healthcare.

They are applicable to new and existing sites, and are for use at various stages during the inception, design, construction, refurbishment and maintenance of a building.

Health Technical Memorandum 2015

HTM 2015 (Bedhead services) focuses on:

- the legal, mandatory and functional requirements;
- design applications;
- maintenance and operation of systems

of electrical, communications and medical gases terminal units required at the bedhead and at other patient locations in all types of healthcare premises.

It is published in three separate volumes, each addressing a specialist discipline:

- **Management policy** – outlines the overall responsibility of managers of healthcare premises and details their legal and mandatory obligations in providing adequate electrical/ communications, gas and vacuum supply facilities for patients. It summarises the technical aspects involved and concludes with a list of definitions;
- **Validation and verification and Operational management** – details the requirements for ensuring that manufactured equipment is formally tested and certified as to contract and manufactured to the highest level of quality assurance. The importance of commissioning and site testing is emphasised and the systems listed. Also provides guidance for those responsible for overseeing and operating day-to-day running and maintenance. Coverage includes voltage

supplies, instruments, quality of radio/television (TV) reception and alarm system function. Record-keeping is also discussed;

- this volume, **Design considerations** – highlights the overall requirements and considerations that should be applied to the design up to the contract document.

Guidance in this Health Technical Memorandum is complemented by the library of National Health Service Model Engineering Specifications. Users of the guidance are advised to refer to the relevant specifications for:

a. medical gases;

b. common services electrical (low and extra low);

c. nurse call systems.

The contents of this Health Technical Memorandum in terms of management policy, operational policy and technical guidance are endorsed by:

- the Welsh Office for the NHS in Wales;
- the Health and Personal Social Services Management Executive in Northern Ireland;
- the National Health Service in Scotland Management Executive;

and set the required standards consistent with Departmental Cost Allowance Guides.

References to legislation appearing in the main text of this document apply in England and Wales. Where references differ for Scotland and/or Northern Ireland, these are given as marginal notes.

Where appropriate, marginal notes are also used to amplify the text.

SOUTH BANK UNIVERSITY
CLASS No. REPORTS SERIES
DATE 3/95
ACC. No. 5678683
L

Contents

About this publication

1. Scope *page 3*

2. Definitions *page 4*

3. List of figures *page 6*

4. Communications – patient-to-nurse (non-speech) *page 18*
4.1 General
4.3 Basic call system
4.4 Visual signals
4.14 Audible signals
4.17 Toilet/bathroom call

5. Communications – staff-to-staff (emergency) *page 20*
5.1 Emergency switch
5.2 Visual signals
5.5 Audible signals

6. Patient's calling devices *page 21*
6.1 General
6.2 Panel-mounted push button
6.4 Call only unit
6.11 Pull cord unit
6.12 Other call units

7. Patient 's handset *page 23*
7.1 General
7.3 Sterilization
7.4 Electrostatic voltages
7.5 Call push
7.7 Reassurance lamp
7.8 Programme controls
7.9 Bedlight control switch
7.10 Attachment clip
7.11 Cable
7.12 Plug
7.13 Monitored call circuit
7.14 Parking bracket
7.15 Ergonomic design
7.16 Supply voltage

8. Bedhead unit *page 26*
8.1 Positioning
8.7 Construction
8.9 Mounting box
8.12 Panels
8.16 Controls
8.17 LV section components
8.17 Twin 13A switched socket-outlet
8.18 Bedlight control switch
8.19 Bedlight fuse unit
8.20 Dimming capacitor
8.21 Bedlight relay
8.23 PELV section components
8.23 Reset switch/indicator lamp
8.24 Socket for handset
8.27 Audio sound driver
8.28 Staff emergency switch
8.29 Parking brackets
8.30 PELV section – options
8.30 General
8.31 Isolation switch
8.34 Dual control

9. Other call system units *page 31*
9.1 Reset unit
9.4 Overdoor/corridor lamps
9.5 Nurse station unit (staff base)
9.9 Power/control units

10. Transfer of calls *page 33*
10.1 General
10.2 Transfer switch
10.3 Visual signals
10.4 Audible signals

11. Speech system *page 34*
11.1 General
11.2 Nurse station unit (staff base)
11.3 Operation
11.7 Bedhead services unit
11.9 Security of communication
11.10 Transfer of speech

12. Nurse presence system *page 36*
12.1 General
12.2 Nurse presence switch
12.3 Visual signals
12.4 Additional tone sounders
12.5 Speech system
12.6 Mimic indicator

13. Cardiac alarm *page 37*
13.1 General
13.2 Operation

14. Intruder alarm *page 38*
14.1 General
14.2 Operation

15. Attack alarm *page 39*
15.1 General
15.2 Transmitter
15.3 Receiver
15.4 Operation

16. Pocket pagers *page 40*
16.1 General
16.3 Priority of calls

17. Flexible nursing *page 41*
17.1 General

18. Centralised nursing *page 42*
18.1 General
18.3 Call logger

19. Entertainment *page 43*
19.1 General
19.6 Television sound
19.7 Digital system
19.12 Television mains and aerial supplies

20. Integrated services *page 45*
20.1 General
20.3 Possible new developments

21. Types of installation *page 46*
21.1 General
21.8 Trunking
21.10 Vertical units
21.15 Plastic enclosures/ducting

22. Low voltage (LV) supplies *page 49*
22.1 13A sockets
22.4 Other sockets

23. Bedhead luminaire *page 50*
23.1 General
23.4 Dimming bedhead luminaires
23.6 Trunking-fitted luminaire

24. Medical gas pipeline systems *page 51*
24.1 General
24.4 Bedhead services enclosure
24.5 Bedhead services trunking/vertical unit

25. Telephones *page 52*
25.1 General
25.2 Isolation ward

26. Electromagnetic compatibility *page 53*
26.1 General
26.4 Electrostatic discharge immunity

1.0 Scope

The importance of achieving correct maintenance/service for complex equipment cannot be overstressed. Unless the management has complete confidence in the ability of the engineering staff to carry out adequate repairs and preventative maintenance, those functions should be assigned to the manufacturer, supplier or other qualified and competent agent.

1.1 Healthcare premises (HCP) will achieve maximum efficiency when patients receive quality treatment appropriate to their needs with the minimum length of stay. To this end the services provided at the point of nursing, that is, at the bedhead, should be tailored to meet not only the short-term requirements but also the longer-term.

1.2 The guidance in this HTM applies primarily to new healthcare premises and major refurbishment work; however, the principles also apply to alterations and extensions to existing installations. It covers bedhead services, and in particular patient-to-nurse call systems. The various types of installation to be considered are described.

1.3 The degree of sophistication will vary greatly over the range between low-dependency areas such as geriatric assessment, and high dependency such as intensive care wards.

1.4 The degree of engineering necessary to provide the nominated services will be influenced by the building structure. Supporting equipment in lightweight walling consisting of composite partitioning will require a totally different approach to established solid walling with possible deep window recesses.

Refer to HTM 2014 – 'Abatement of electrical interference'.

1.5 As electronic systems become more sophisticated, the importance of electromagnetic compatibility (EMC) needs to be recognised. This includes the potential problems with electrostatic discharges (ESD) derived from the high static voltages that can be generated at the bedside.

2.0 Definitions

2.1 Injury – death or personal injury from electric shock, electrical burn, electrical explosion or arcing, or from fire/explosion initiated by electrical energy or misuse/faults with medical gas supplies.

2.2 System (electrical) – a system in which all the electrical equipment is, or may be, electrically connected to a common source of electrical energy, including such source and such equipment.

2.3 System (communication) – a system designed to provide transfer of information between two or more locations, either by direct wiring or by other means. The system will embrace the necessary control units and power supplies.

2.4 System (medical gas pipeline) – a system designed to provide medical gases, medical compressed air and vacuum, derived from plantroom, compound and/or manifold rooms and including all associated peripheral equipment such as regulators, area valves, alarm and control systems.

2.5 Low voltage (LV) – the existence of a potential difference (rms value for a.c.) normally not exceeding 1000 volts a.c. or 1500 volts d.c. between circuit conductors, or 600 volts a.c. or 900 volts d.c. between circuit conductors and earth.

This definition for low voltage incorporates the extra low voltage (ELV) range as defined in BS7671:1992 'Requirements for Electrical Installations' (the IEE Wiring Regulations, 16th edition).

2.6 Protective extra-low voltage (PELV) – an extra-low voltage system that is not electrically separated from earth, but otherwise meets all the requirements for safety extra low voltage (SELV). The installation requirements for SELV systems are specified in BS7671:1992, 'Requirements for Electrical Installations' (the IEE Wiring Regulations, 16th edition).

Bedhead services systems should have one side of the d.c. voltage earthed at the power/control unit only. It is recommended that the remainder of the system wiring be free from any earth connection. A reduced potential difference of 30 volts peak between points is recommended for hand-held call units.

2.7 Essential circuits – circuits of the essential services electrical supply so arranged that they can be supplied separately from the remainder of the electrical installation.

2.8 Bedhead services – facilities provided for patients and/or staff to enable the performance of medical and surgical functions and entertainment. They comprise a fixed installation behind, to the side of or above the bed, and can also embrace other areas of the ward. They can consist of low voltage electrical supplies, extra low voltage communication systems, entertainment, monitoring facilities and medical gas outlets.

2.9 Light emitting diode (LED) – a robust solid-state indicator lamp with indefinite life, ideal for low-powered visual display and signalling use.

2.10 Electromagnetic compatibility (EMC) – capability of electronic equipment or systems to be operated with a defined margin of safety, in the intended operational environment, at designed levels of efficiency, without degradation due to interference.

2.11 Monitored call circuit – the call system will register a call if the hand unit connector to the bedhead or wall-mounted panel is withdrawn or an open circuit cable fault occurs.

2.12 Simplex – a speech system where the nurse station unit has a push-to-speak switch, which is held down while speaking and released for listening. The operation at the bedhead is "hands-free".

2.13 Duplex – a speech system which is "hands-free" at both ends, that is, at both the nurse station and the bedhead.

3.0 List of figures

1. Basic call system

2. Basic call system with bedhead units

3. Arrangement of overdoor and group lamps

4. Typical layout of patient handset with examples of symbols

5. Typical attachment clips

6. Examples of symbols for bedlight control on bedhead panel

7. Bedlight dimming circuit for GLS lamp

8. Typical layout of bedhead services panel

9. Typical layout of bedhead services panel with additional facilities of an isolation switch and dual control

10. Power supplies (typical)

11. Typical layout of patient handset with speech

12. Typical multiplexed audio entertainment distribution system

13. Typical arrangement for a horizontal trunking system

14. Typical arrangement for a vertical unit

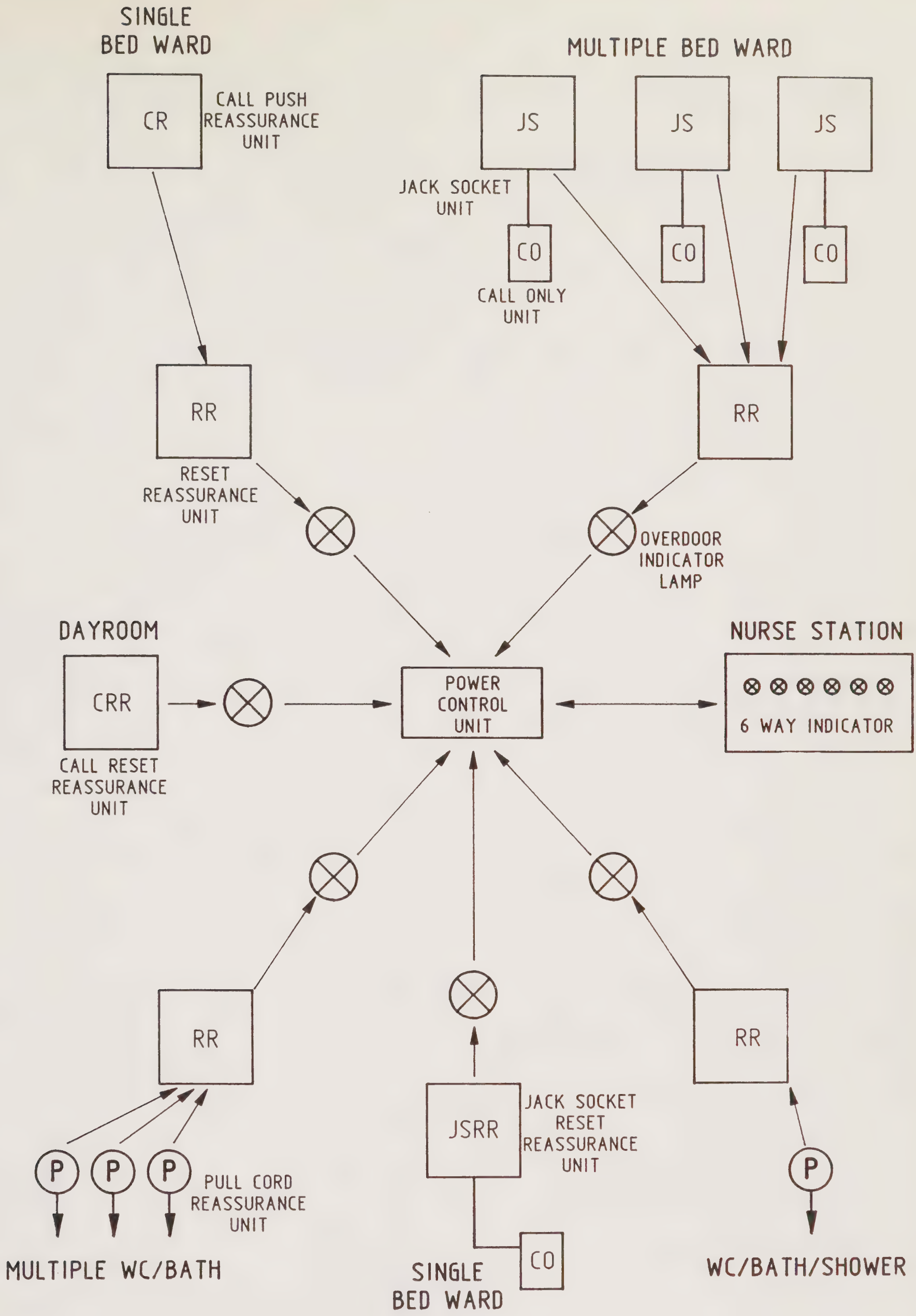


FIGURE 1
BASIC CALL SYSTEM

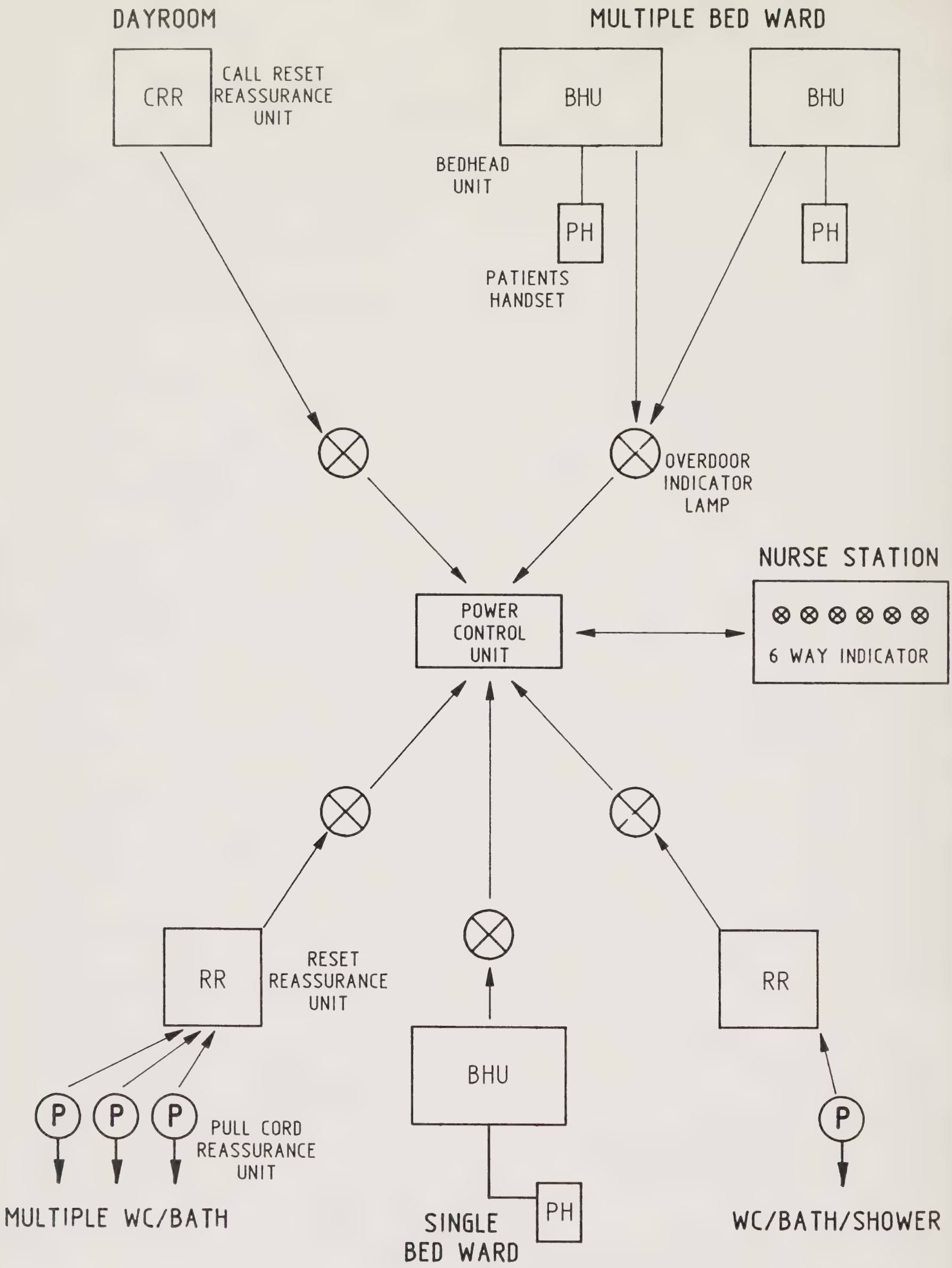


FIGURE 2
BASIC CALL SYSTEM
WITH BEDHEAD UNITS

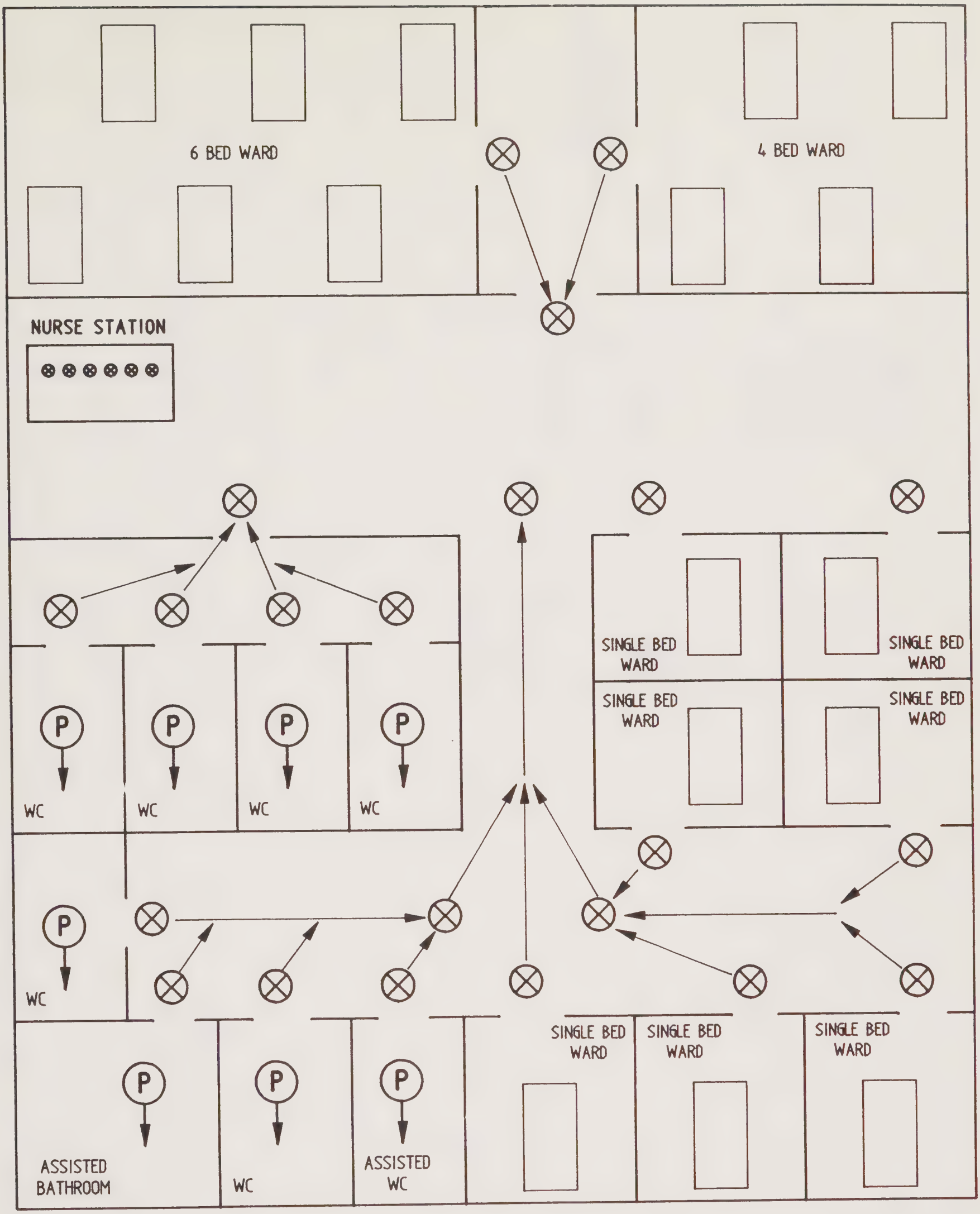


FIGURE 3
ARRANGEMENT OF
OVERDOOR & GROUP LAMPS

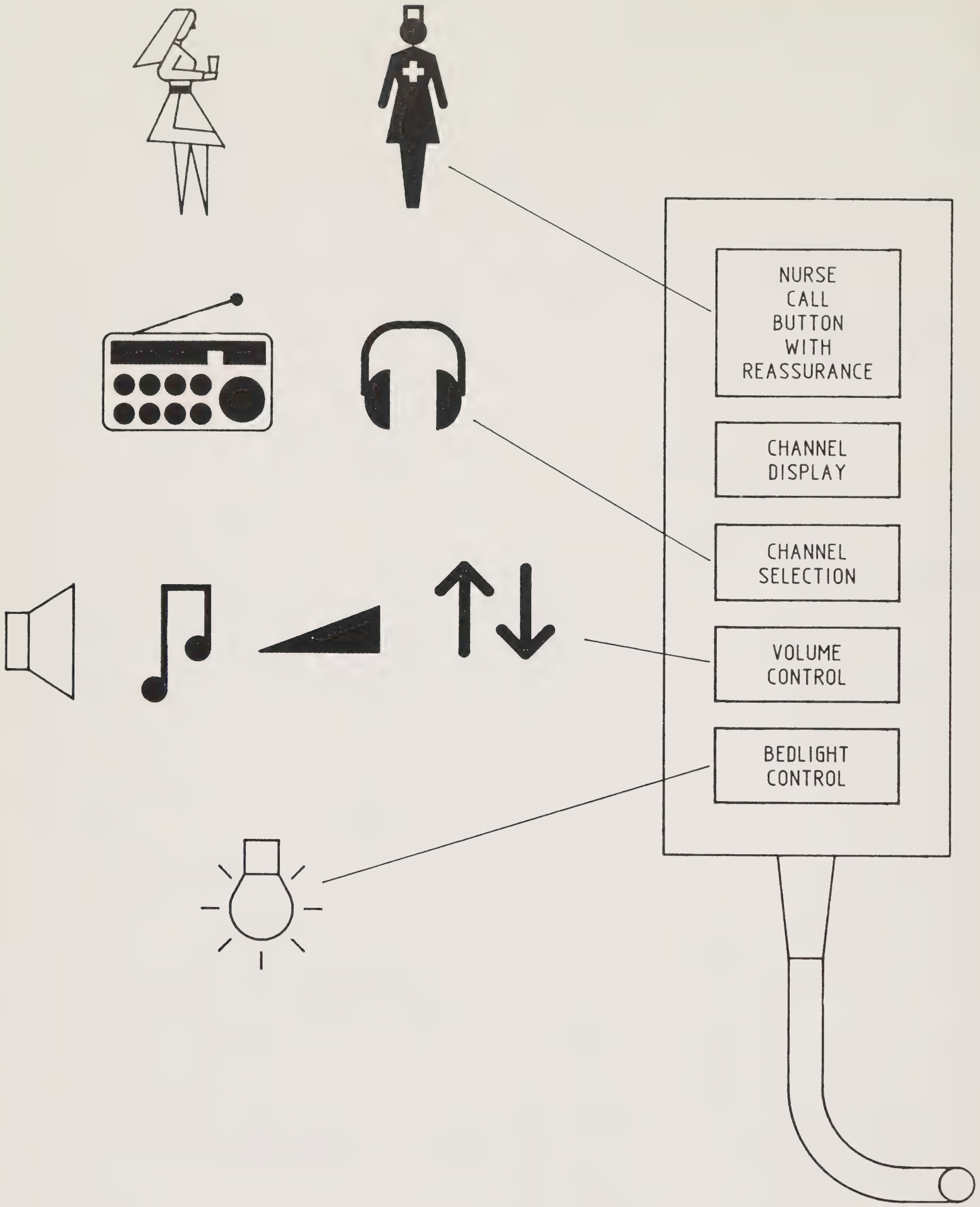


FIGURE 4

TYPICAL LAYOUT OF PATIENT HANDSET
WITH EXAMPLES OF SYMBOLS

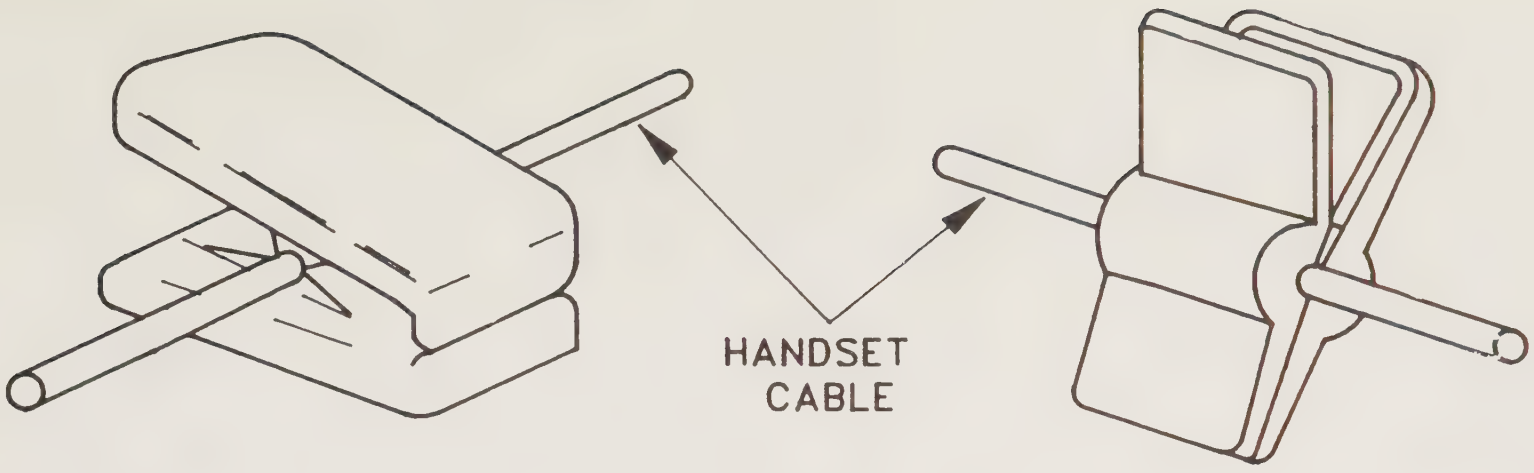


FIGURE 5
TYPICAL ATTACHMENT CLIPS

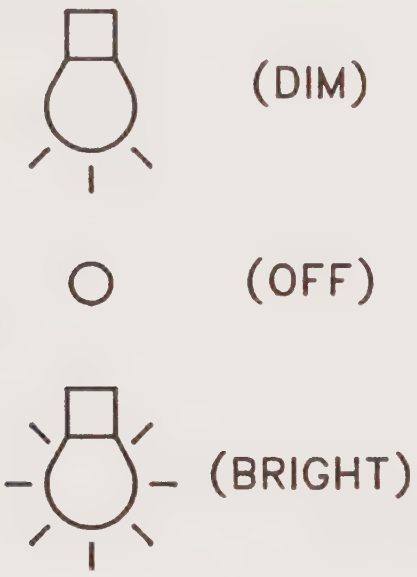


FIGURE 6
EXAMPLES OF SYMBOLS FOR BEDLIGHT
CONTROL ON BEDHEAD PANEL

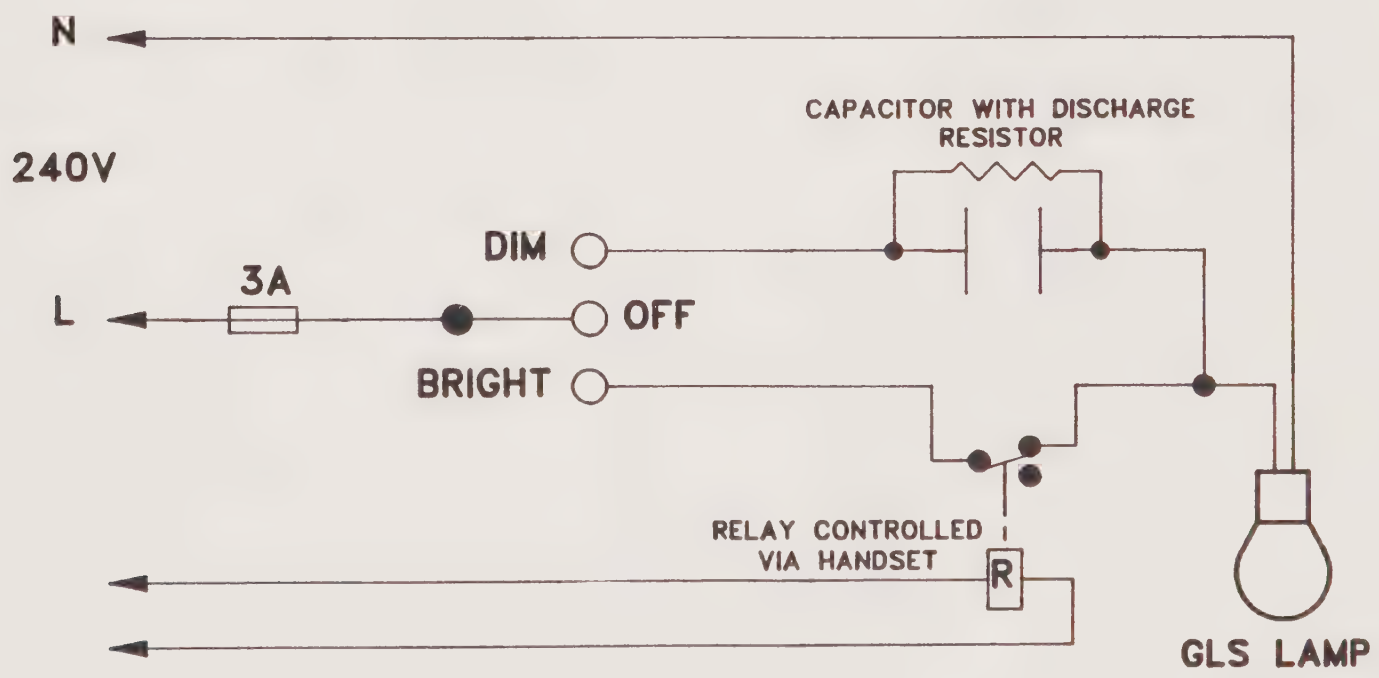


FIGURE 7
BEDLIGHT DIMMING CIRCUIT
FOR GLS LAMP

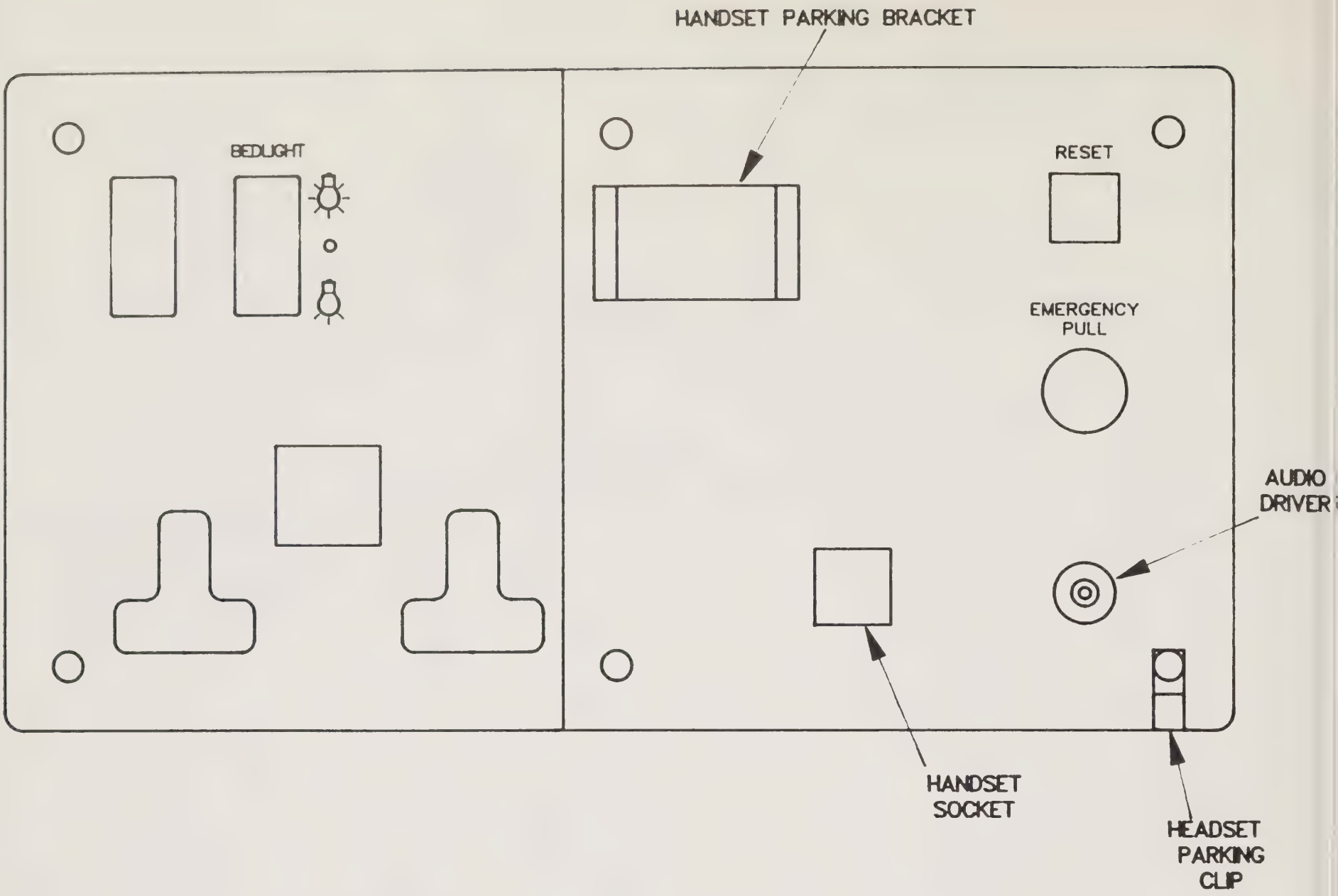


FIGURE 8

TYPICAL LAYOUT OF BEDHEAD SERVICES PANEL

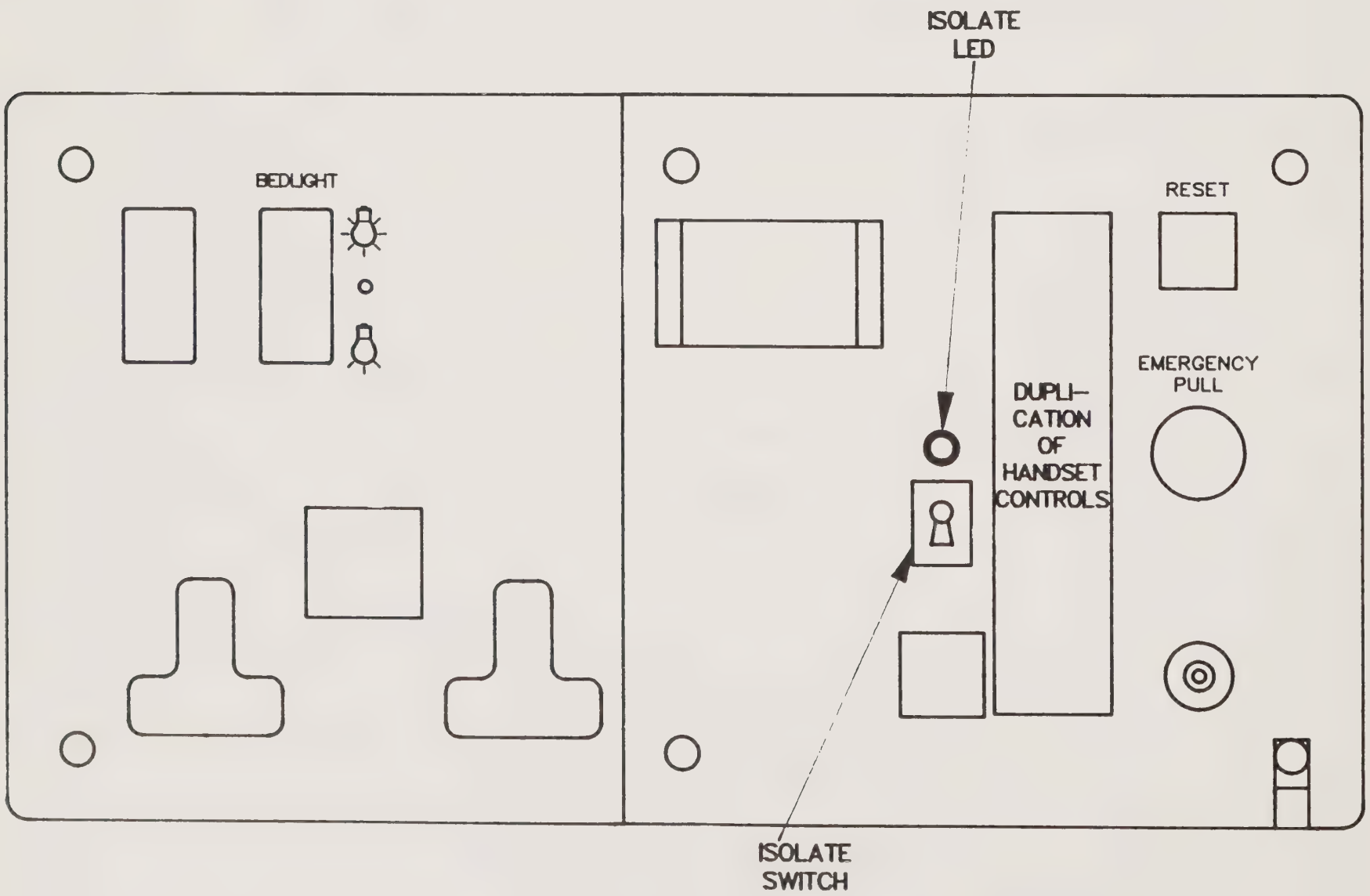
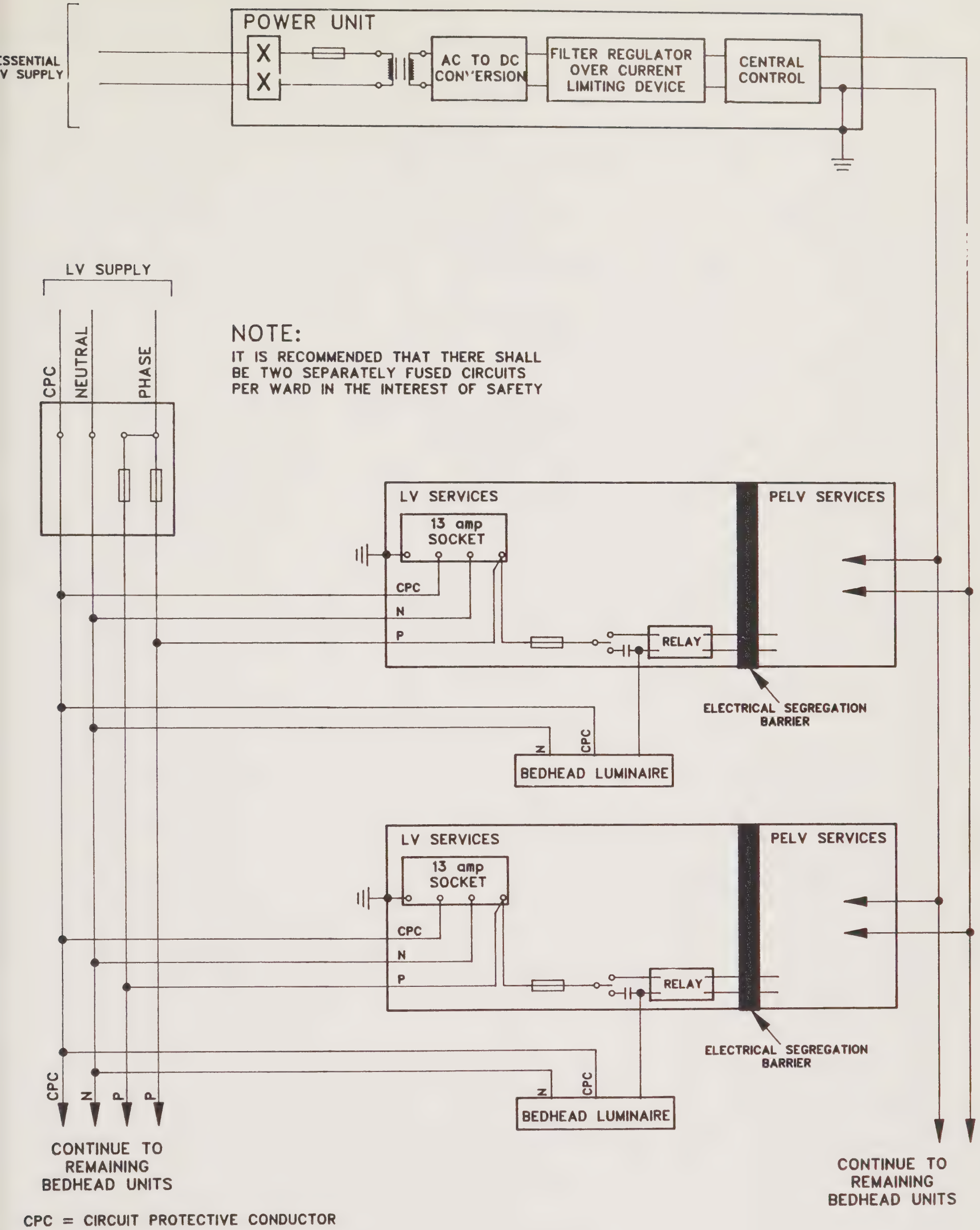


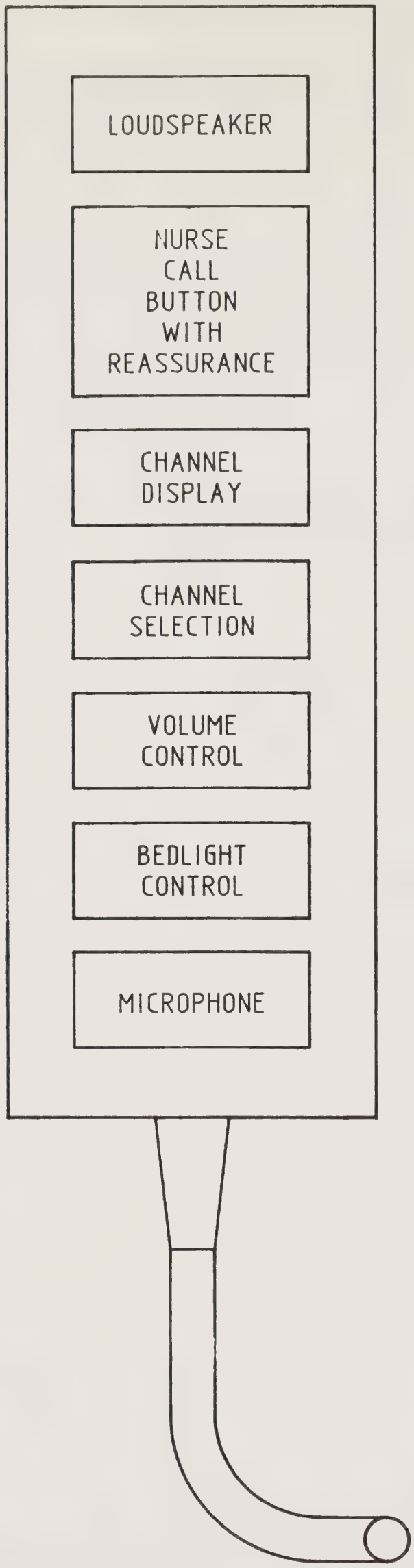
FIGURE 9

TYPICAL LAYOUT OF BEDHEAD SERVICES PANEL WITH ADDITIONAL FACILITIES OF AN ISOLATION SWITCH AND DUAL CONTROL



CPC = CIRCUIT PROTECTIVE CONDUCTOR

FIGURE 10
POWER SUPPLIES (typical)



SEE FIGURE 4 FOR EXAMPLES OF SYMBOLS

FIGURE 11

TYPICAL LAYOUT OF PATIENT HANDSET WITH SPEECH

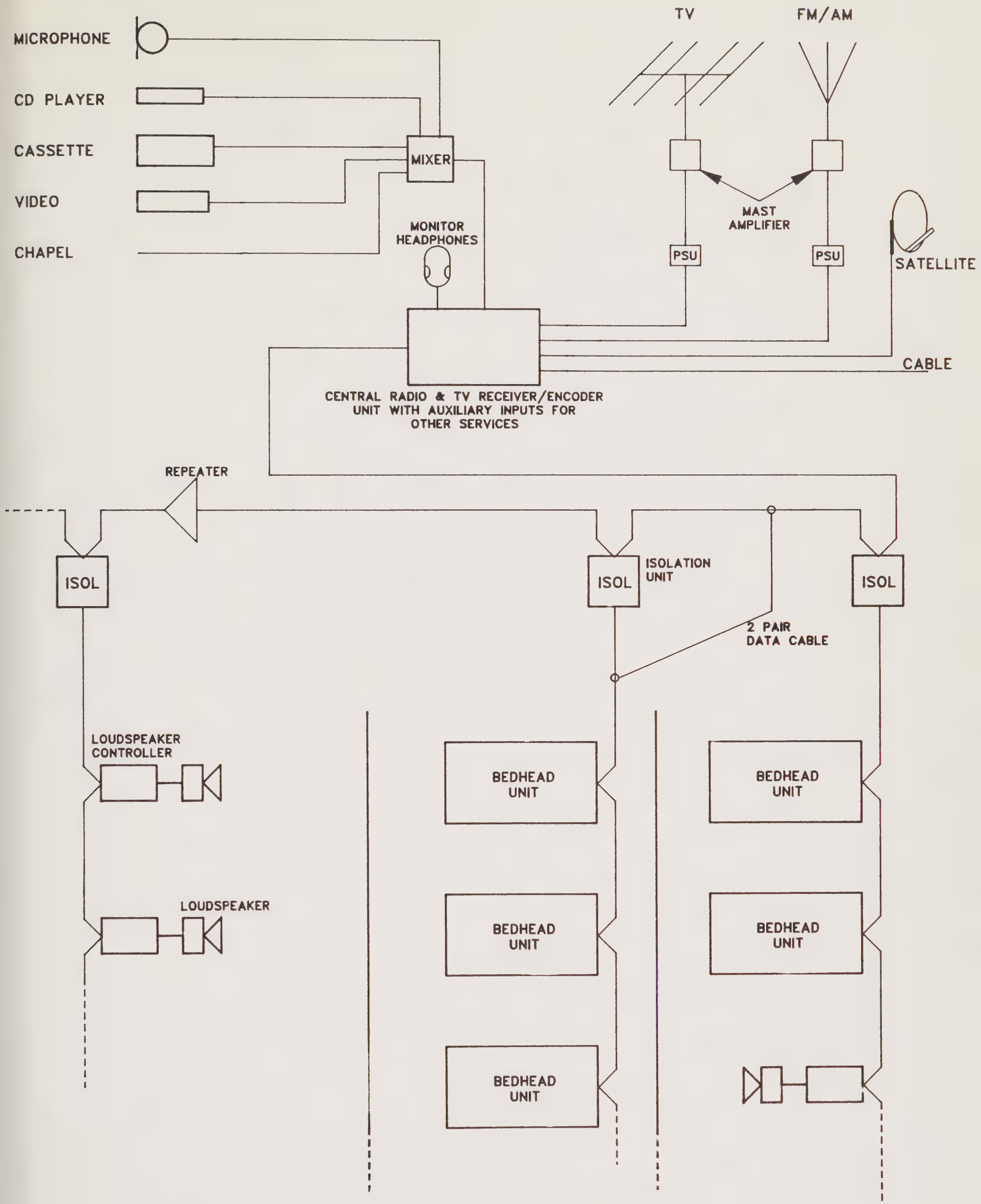


FIGURE 12

TYPICAL MULTIPLEXED AUDIO ENTERTAINMENT DISTRIBUTION SYSTEM

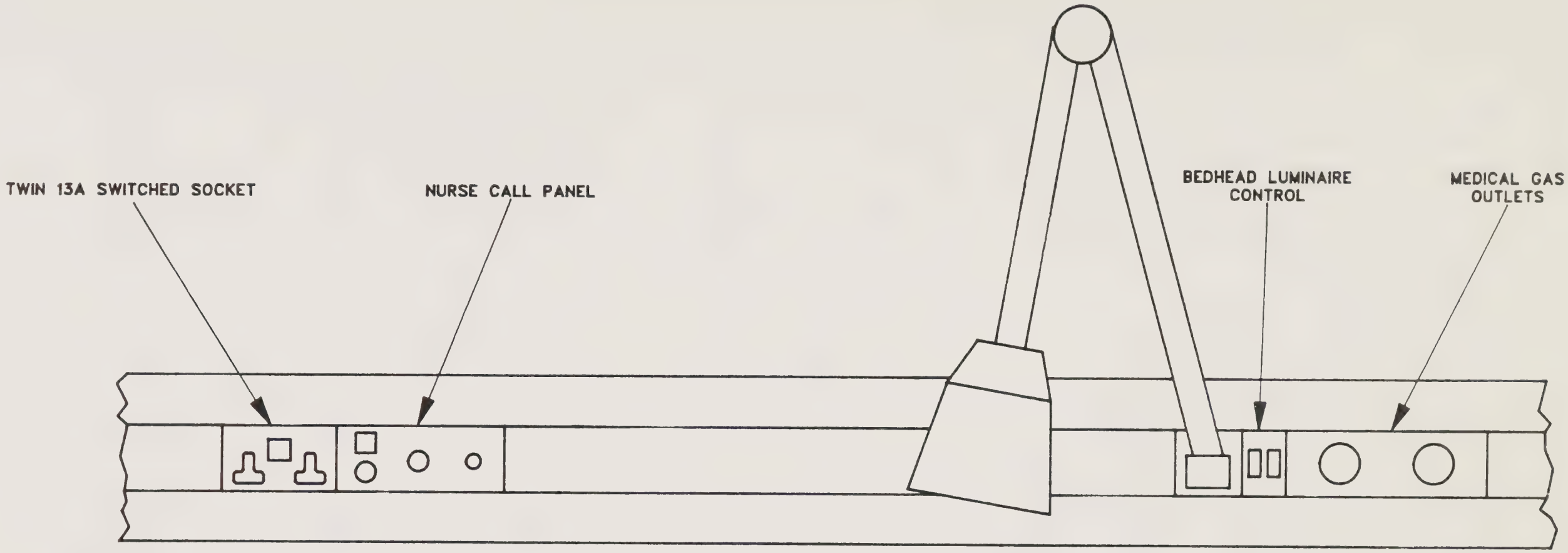


FIGURE 13

TYPICAL ARRANGEMENT FOR A HORIZONTAL TRUNKING SYSTEM

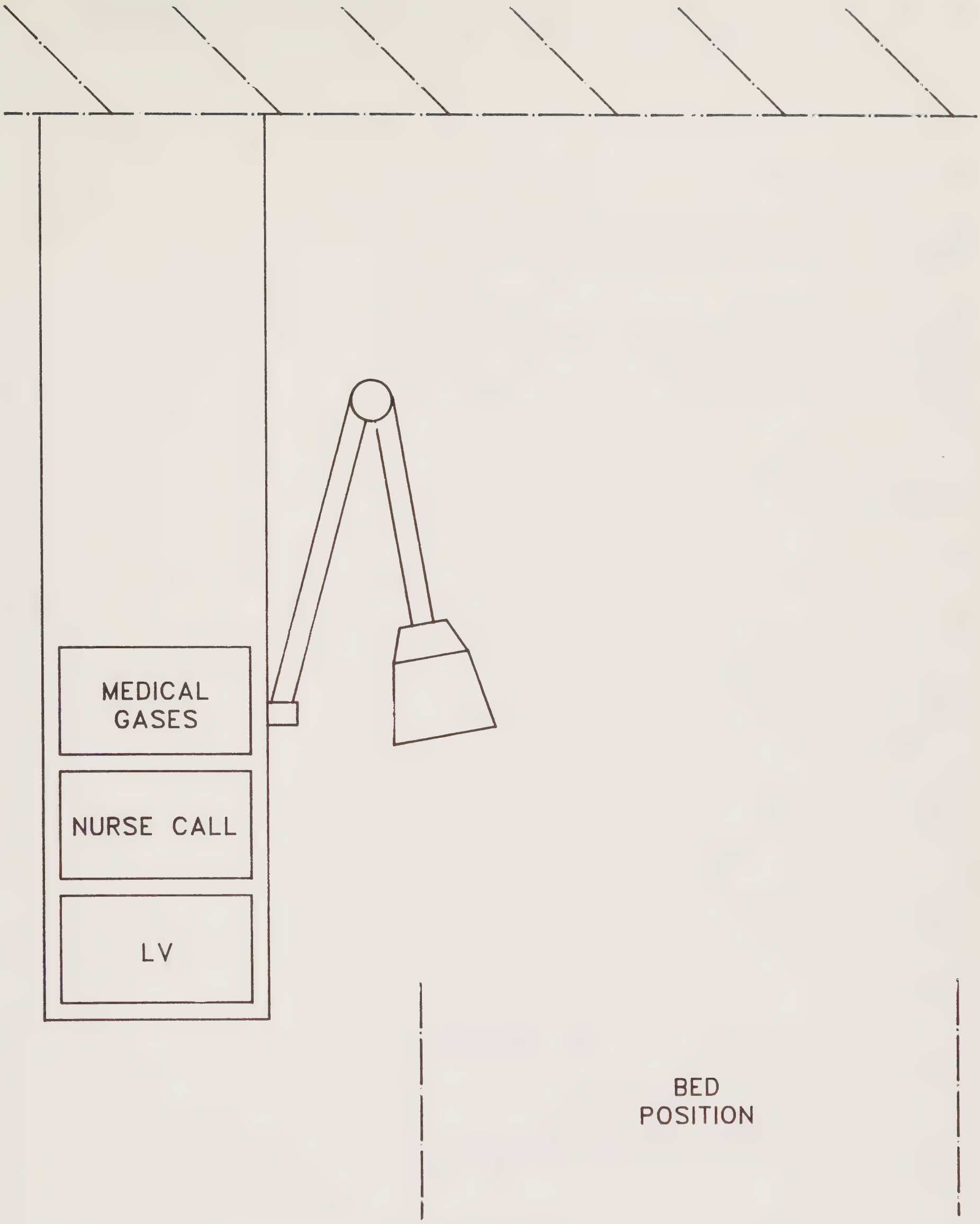


FIGURE 14

TYPICAL ARRANGEMENT FOR A VERTICAL UNIT

4.0 Communications – patient-to-nurse (non-speech)

General

4.1 The modern tendency to house patients in rooms or bays with a small number of beds within the greater ward complex, increases the need to provide some means whereby a patient can call for attention.

4.2 In some cases the means of making a call may be inappropriate for some groups of patients; for example, the elderly may be confused, children and psychiatric patients may misuse the system. To ensure maximum flexibility of use, however, it is recommended that at least a basic call system is installed but it is made inoperative (or the means of call is temporarily removed) for such groups.

Basic call system

4.3 A basic call system might comprise the following elements:

a. a means for the patient to make a call;

b. a device for latching or maintaining the call until it is cancelled;

c. a means of resetting the call;

d. a lamp to reassure the patient that the call has been made;

e. a lamp at the staff base or nurse station to indicate that a call has been made;

f. a lamp or lamps along the route between nurse station and calling point to guide staff to the source of the call;

g. an audible tone until the call is cancelled;

h. a power supply and control unit.

Examples of basic call systems are shown in Figures 1 and 2.

Visual signals

4.4 A patient call will be initiated by operating a push button on the handset, a wall-mounted push button in areas such as dayrooms, treatment rooms etc, or by pull cord switches in toilets, bathrooms, showers etc.

4.5 Combined within, or in close proximity to, the calling devices in paragraph 4.4, a reassurance lamp should illuminate steadily within sight of the patient.

Where a call push and a reset push are combined together on a single panel, the lamp within the reset push can serve as the reassurance lamp.

4.6 Combined within the local reset push, a lamp should illuminate steadily.

4.7 A lamp outside and above the door of the ward/cubicle should illuminate steadily. Where no door exists such as in an open bay, a lamp should be positioned in an alternative position such as in the corridor ceiling.

4.8 Where the calling location is not adjacent to the main corridor and is, for example, served by a side corridor or passageway, the lamp should be duplicated as often as necessary so that a follow-the-light procedure can apply.

4.9 A lamp should illuminate steadily at the nurse station or staff base.

4.10 A lamp should illuminate steadily, when required, in areas such as Sister's office, kitchen, utility rooms.

4.11 All of the above lamps should remain in the steady state until the related call is cancelled at the associated reset unit. It should not be possible to cancel the call at any other position.

4.12 Where groups of calling points occur, as in multi-bed wards and toilet/bathroom suites, it is usual to provide a single overdoor lamp to indicate any of the calls collectively. This arrangement would continue with any duplicated corridor repeater lamps and also at the nurse station (see Figure 3).

4.13 The existence of a call should not prevent any other call from being made. The resetting of a call should not cancel or affect any other call that is in force. An exception is where a toilet/bathroom suite is controlled by a common reset unit.

Audible signals

Additional remote line buzzer units may be required in utility rooms.

4.14 An audible signal should be provided at the nurse station in the form of a tone with a fixed frequency, typically in the range 500 to 800 Hz. For a patient call, the tone should sound 1 second on, 9 seconds off until all calls are cancelled. A switch on the nurse station panel should be provided to reduce the volume at night. There should be no means of switching off the tone altogether.

4.15 The tone sound should be reproduced at strategic positions throughout the ward to alert staff generally. These sounders should also be quietened at night, controlled by the switch at the nurse station.

4.16 The tone sound should be reproduced, when required, in areas such as Sister's office, kitchen and utility rooms; in these cases it may be preferable to have no reduction of volume at night. The Sister's office unit may need to incorporate an on/off switch.

Toilet/bathroom call

4.17 It may be a requirement that a greater priority is given to a patient call made from a toilet area or bathroom than any other patient call. In this event the overdoor lights should remain steady and the sounder should have a different tone/repetition rate to distinguish it from a normal patient call and an emergency call (see paragraphs 4.14 and 5.5).

5.0 Communications – staff-to-staff (emergency)

Emergency switch

5.1 With the possible exception of low dependency areas, it is necessary to give nursing staff the ability to call for assistance should the need arise while attending to a patient. A switch for this purpose should be incorporated in the bedhead services panel and in any other area where assistance may be required. Areas which have no other form of communication may require this facility, for example treatment rooms. The switch will operate with a pull on/ push off action to prevent inadvertent operation. It should be coloured red and labelled "Emergency Pull".

Visual signals

5.2 Operation of the staff emergency switch at any bed or other location where fitted, will cause the sequence of lamps as described in paragraphs 4.5 to 4.12 to illuminate in a flashing mode (whether a normal call is in force or not) until the emergency switch is returned to normal. The flash rate will be 0.5 seconds on/0.5 seconds off.

5.3 Where a group lamp is positioned to indicate calls from more than one source, the raising of an emergency call from one section should not be masked by a steady illumination from another section which has a normal call in operation.

5.4 Operation of the emergency switch should cause the system to operate in one of the following ways:

a. it should override any patient calls on the system when the emergency call is made, storing these until the emergency call is cancelled, when they are reinstated automatically;

b. it should not affect any patient or emergency calls from any other point that are in force or need to be made during the emergency. Group lamps should operate as described in paragraph 5.3.

Audible signals

5.5 Use of an emergency switch should cause all the tone sounders of the system to operate in phase with the flashing lamps. Frequencies typically used are:

a. a dual tone operation: 0.5 seconds at 1000 Hz and 0.5 seconds at 500 Hz;

b. a single tone on/off operation: 0.5 seconds at 800 Hz and 0.5 seconds off.

5.6 If the quiet (or mute) setting of the control switch at the nurse station has been selected, this will be overridden.

6.0 Patient's calling devices

General

6.1 Whatever form it may take, the device a patient will use to make a call should be easy to operate even with arthritic hands. The push button should be easily recognised by its colour (orange) and by a nurse symbol indelibly engraved/printed on or alongside the device wherever practical. Examples of typical nurse symbols are shown in Figure 4. Switches used for calling devices should have a tactile feel.

Panel-mounted push button

6.2 The push button should be large and easily recognisable. Associated with the push button either integrally or alongside, a reassurance lamp in the form of a filament lamp (typically 1 watt) or light emitting diode (LED) with an amber or red lens should be fitted.

Wherever practical, the patient's calling device should be coloured orange to aid recognition.

6.3 This form of calling device is not particularly suitable for patients in bed unless the unit is mounted within easy reach, for example on the side of a fixed locker. It is suitable for areas frequented by ambulant patients such as a dayroom or rehabilitation centre.

Call only unit

6.4 The push button should be large and easily recognisable. Associated with the push button either integrally or alongside, a reassurance lamp in the form of an LED with amber or red lens should be fitted.

6.5 The push button should be permanently illuminated to a level sufficient to allow easy location in the dark, but should not be so bright as to be confused with the reassurance lamp. The lamps should not be of a filament type due to their relatively fragile nature.

6.6 The unit should be ergonomically designed, with a flexible lightweight cable typically 2 metres in length. The means of attachment at both ends of the cable should be in the form of an effective strain relief device. The plug should be of a pattern that will disengage from the wall socket when strain is applied to the cable without damage to either plug, socket or cable. Where the same plug and socket is used for a call only unit as an alternative to a patient handset, the circuitry of the call only unit should be compatible with that of the handset so that the socket can be used for either.

6.7 Some means of attaching the call only unit securely to the bedclothes or patient's clothes should be available, but such means should not tear the clothing if sufficient force is applied to effect disengagement. Typical clips are shown in Figure 5.

6.8 Within the call only unit or its cable the recommended potential should not exceed 30 volts peak between any two points including earth. The nurse call circuit should be monitored so that a break in the cable or withdrawal of the plug will initiate a call.

6.9 A parking clip or bracket should be provided to allow the unit to be stored on the wall or locker unit when not in use (see paragraph 8.29 for further details).

6.10 In order to avoid false calls due to switch bounce if the unit is knocked or falls to the floor, the nurse call function should not be sensitive to a switch operation of less than 5 milliseconds.

Pull cord unit

6.11 In showers, bathrooms and toilets, the patient calling device is normally a ceiling-mounted pull cord unit. It is important that the pull cord is easily recognised as the calling device and cannot be confused with a light switch. The cord should be coloured orange, as should the "acorn", the latter being indelibly marked with the nurse symbol (Figure 4). The pull cord unit should incorporate a reassurance lamp with an amber lens. The switch should have a momentary action.

When, in a wet area, a ceiling-mounted pull cord unit may be inappropriate (examples – psychiatric bathroom or hydrotherapy pool), a wall-mounting push button with an IP rating of 66 is acceptable.

Other call units

6.12 Where bedlight control is required in addition to the call facility, a switch marked with the bright bulb symbol (see Figure 4) should be added to the call unit described in paragraphs 6.4 to 6.10.

6.13 A pneumatically operated call unit can be used for patients who are unable to use their hands. The unit comprises an air bulb and connecting tube, terminating in an air velocity operated switch mounted integrally with a 2 pole 6 mm jack plug.

7.0 Patient's handset

General

7.1 It is not practical to expect bedded patients to operate controls positioned on a wall-mounted panel, and the use of hand-held units is very commonplace. Where control of entertainment channels and bedlight are required in addition to patient call, a multifunction handset is required. A typical handset is shown in Figure 4.

7.2 Patients' handsets will be subject to misuse. Those which are poorly designed will be susceptible to any rough handling, thereby creating a continuing maintenance cost.

Sterilization

Manufacturers must state which sterilizing materials can be used on their handsets, and the recommended method of sterilizing.

7.3 Traditional handsets have suffered considerably from ingress of food, drink and body fluids, giving rise to breakdown and potential contamination. The modern multifunction handset should have a rating of IP 67 to BS EN 60529:1992 to enable dip sterilization. Alternatively, the unit should have a disposable sleeve which can be sterilized or replaced as and when required.

Electrostatic voltages

7.4 The handset should not be affected by the high electrostatic voltages generated in the hospital environment; see paragraphs 26.4 and 26.5 for the test details.

Call push

7.5 The patient call push button should be coloured orange and marked with the nurse symbol. It should be the largest button on the unit and the switch should have a tactile feel. In order to avoid false calls due to switch bounce when the handset is dropped or knocked, the call function should not be sensitive to a switch operation of less than 5 milliseconds.

Lamps fitted within patients' handsets should be of the robust LED type rather than the more fragile filament type.

7.6 For ease of location at night, the call push button should be permanently illuminated, but not so brightly that it could be confused with the reassurance lamp.

Reassurance lamp

7.7 A reassurance lamp in the form of an LED with amber or red lens should be positioned adjacent to the call push.

Programme controls

7.8 There is an increasing move to distribute entertainment to patients using digital techniques via data cable which means that the number of channels can be far more than when conventional wiring is used. Simple programme selection is essential and this can be achieved with one or two push buttons for sequential stepping of channel numbers. Likewise, the control of volume should be with two similar push buttons. The channel number selected should be displayed by a seven-segment LED indicator. All controls should be clearly marked with their function (see Figure 4).

Historically, the recommended number of programmes supplied to patients has been four or six, mainly limited by the amount of cabling required. The use of digital transmission techniques means that the number of programmes can be greatly increased.

Bedlight control switch

7.9 Patients should be given the facility to switch their bedlight on or off. A push button on the handset should effect control via a relay in the bedhead panel, see paragraph 8.21. The button should be marked with a lamp symbol as shown in Figure 4.

Attachment clip

7.10 Some form of clip should be provided on the handset or the cable to allow attachment to the patient's clothes or bedclothes. It should be so designed that any undue force will allow the clip to disengage without tearing the material. For examples see Figure 5.

Cable

7.11 The handset cable should be lightweight and flexible with no more than six conductors. At both ends the cable should be anchored positively. The cable should be typically 2 metres in length.

Plug

7.12 The handset plug should be of a pattern that will disengage from the wall socket when strain is applied to the cable. The plug and socket should be suitable for the light current levels used by the digital electronics in modern multifunction handsets. One type of plug that has been used successfully is the BT Type 420 4 pole jack plug.

Monitored call circuit

7.13 The nurse call circuit should be monitored so that a break in the cable or withdrawal of the plug will initiate a call.

If all handset facilities are multiplexed, the call function should be self-checking to ensure that the integrity of the link to the bedhead panel is not impaired.

Parking bracket

7.14 The handset should be designed to fit a parking bracket – see paragraph 8.29.

Ergonomic design

7.15 The handset should be ergonomically designed, robust and of lightweight construction. The rear of the unit should incorporate an anti-slip surface to prevent the handset from being dragged onto the floor by the weight of the cable when placed on a standard over-bed table or locker.

Supply voltage

7.16 It is recommended that the circuit of the handset should not contain a voltage of more than 30V peak between any two points including earth.

8.0 Bedhead unit

Positioning

8.1 A panel mounted on the wall and to the side of the bed is a convenient means of providing the electrical services that will be required by both patients and staff.

For trunking-mounted bedhead services and vertical units see paragraphs 21.8–21.14.

8.2 The tendency is for nursing to be carried out on the patient's right-hand side; the panel should therefore be positioned on that side.

8.3 In some cases, treatment is required on the patient's left. The panel should not be obscured when the bed and furniture are moved to allow treatment from that side.

8.4 Raising, lowering or tilting of the bed should not obscure or damage the panel nor any component plugged into or attached to it.

8.5 The mounting of services to a moveable locker with a flexible connection to the wall is not recommended.

8.6 Where tall fixed lockers are installed, it may be deemed preferable to mount all or some of the electrical services in the side of the locker facing the patient; this is likely, however, to complicate the cabling installation.

Construction

8.7 Separate panels should be used for low voltage (LV) and protective extra-low voltage (PELV) services. This allows access to the PELV section for servicing without having to isolate the LV circuits. A typical bedhead panel is shown in Figure 8.

8.8 Segregation between LV and PELV should be in the form of a barrier to fulfil the requirements of BS7671:1992 (the IEE Wiring Regulations).

Mounting box

8.9 The backbox should typically be a standard sheet steel adaptable box. Typical dimensions are 300 mm wide x 150 mm high x 50 mm or 75 mm deep, depending upon internal requirements and site mounting arrangements.

Where possible, for reasons of neatness and cleanliness, bedhead panels should be flush-mounted. When it is necessary to surface-mount the unit, the box should be of neat appearance with sealed corners to prevent ingress of dust and insects.

8.10 The finish of the box should be to BS4568:Part 1:1970 Class 2 medium protection, for example stove enamel.

8.11 Within the LV compartment an earthing terminal should be provided to give efficient and reliable electrical connection to the box.

Panels

8.12 The panels should be manufactured from stainless steel (minimum 1.5 mm thickness) or other metal of adequate stiffness, suitably protected against corrosion and having non-reflective surfaces. They should overlap the flush boxes by approximately 12 mm.

8.13 The two panels should be fixed with not fewer than six screws, preferably with a mushroom or pan head. Where the two panels meet there should be some means to ensure alignment of both front surfaces and also the top and bottom edges.

8.14 The front surfaces of the panels should show no fixing device used to attach components to the panels, nor should there be any obvious blemishes resulting from such fixings.

8.15 All exposed surfaces should have an ingress protection rating of at least IP 20.

Controls

8.16 The controls on bedhead services panels should be easy to use. They should be marked by adequately sized engraving or silk screen printing in an indelible manner; the colour of the marking should be in bold contrast to the panel colour.

LV section components

Twin 13A switched socket-outlet

8.17 A twin 13A switched socket-outlet complying with BS1363 should be fitted. In some nursing areas it is necessary to supply these sockets at all beds or alternate beds from the essential supply. For easy recognition, such sockets should ideally have red switch dollies; alternatively, a letter "E" coloured red should be marked on the panel in close proximity to the socket. The LV power circuit wiring should be taken directly into the socket connections and not via an intermediate connector within the unit.

Bedlight control switch

8.18 A bedlight control switch should be fitted complying with BS3676:1989; this switch should be a flush two-way three-position rocker type to give "Dim-Off-Bright" control. The panel should be marked with the word "Bedlight" and to the side, the symbols as indicated in Figure 6.

Bedlight fuse unit

When the bedlight switch and fuse are mounted close together, the single word "Bedlight" can be used to embrace both components.

8.19 A bedlight fuse unit should be fitted. Power for the reading lamp will be derived from the 13A socket wiring via a flush-mounting fuse carrier suitable for use on a 32A ring main and incorporating a 3A fuse to BS1362:1973 (1992) replaceable from the front of the panel. The panel should be marked with the word "Bedlight".

Dimming capacitor

8.20 It is commonplace for the bedlight to use a 60 watt GLS lamp, and a convenient means of achieving dimming to a satisfactory level is to switch in series with the lamp a 2.2 µF capacitor rated at 250V a.c. rms. A discharge resistor, typically 1 Mohm, should be connected across the capacitor. Some manufacturers have the resistor built into the capacitor. See Figure 7.

In cases where the bedlight takes the form of a ceiling-mounted spotlight rather than an adjustable arm type of fitting, and the lamp used is 100 watts, the dimming capacitor value will be 3.0 µF rated at 250V a.c. rms.

Bedlight relay

8.21 The relay provides the means to switch the LV bedlight circuit on and off from the patient's handset via the PELV control section of the bedhead panel while the bedlight control switch is in the "bright" position.

8.22 The relay should be mounted in the LV section of the bedhead unit and adjacent to the segregation barrier. The PELV connection to the relay should pass through a grommeted hole in the barrier. The relay should be capable of withstanding a high voltage test of 3500V a.c. rms between the LV and PELV conductive parts. The relay should be either a mechanically latched type or a magnetic impulse type with continuously rated coil/coils. Contacts should be rated at 250V a.c. rms, 10A minimum.

PELV section components

Reset switch/indicator lamp

8.23 For resetting the patient call this switch should have a flat-topped translucent orange or amber lens and a lamp typically rated at 28V, 1.1 watts. The lamp should be easily replaceable from the front. The panel should be marked "Reset" above the switch.

Socket for handset

8.24 The socket should be suitable for receiving the plugs fitted to both the patient's handset and call only unit.

8.25 The circuit connections to the socket should ensure that any short circuits developed in the handset or call only unit or their associated leads cannot result in damage to any other component. If such short circuits are capable of causing the nurse call system to malfunction, such effects must be localised to ensure that the integrity of other parts of the system is maintained.

Where it may be necessary to deprive a patient of a handset or call only unit due to misuse, a dummy plug should be available, insertion of which will enable the call (which is automatically raised with no plug present) to be cancelled, see paragraph 7.13.

8.26 If the 4 pole BT type 84A socket is used, circuit connections should ensure that:

a. if a telephone is plugged into the bedhead unit, no damage will result to either;

b. if a handset or call only unit is plugged into a socket of a telephone system, no damage will result to either.

The sound quality and comfort of "stethoscope" type headsets is considered adequate for general ward use. They are relatively inexpensive, sterilizable and durable. Alternatively, a lightweight electromagnetic headset can give improved sound quality. For these, a jack socket will be required on the panel.

Audio sound driver

8.27 A popular type of headset provided for patients is the "stethoscope" type. The acoustic tube to the headset should mate firmly with a spigot attached to the panel-mounted driver unit. The audio power generated at the sound driver should be typically 25 mW.

Staff emergency switch

8.28 The emergency switch should operate with a pull-on/push-off action. It should be coloured red and the panel above the switch should be marked "Emergency Pull". See paragraph 5.1.

Parking brackets

8.29 Suitable means of parking the loose accessories at the bed, that is, handset or call only unit and headset, should be provided on the bedhead panel and additionally, when required, on the locker. Requirements are as follows:

a. it should be clear which device the bracket is provided for, this being marked with an appropriate symbol;

b. when parked on the locker, the handset or call only unit should be easy to operate by the patient;

c. when parked on the locker the handset or call only unit should be easily placed into or removed from its bracket by a frail patient lying supine or prone and whose arm is at full stretch;

d. the positioning of the parking bracket on the bedhead panel should be such that the handset or call only unit or their cables do not obstruct other components or access to other components on the bedhead panel;

e. the brackets should hold their devices positively so that they do not become accidentally dislodged by such knocks and pulls as may be expected in normal service. The handset or extended call push should nevertheless disengage from its bracket if abnormal forces are applied to the device or its cables, and such disengagement must cause no damage to any part;

f. to reduce the risk of injury or breakage, the bracket material should be tough and deformable and not project more than 20 mm. Edges and corners should be rounded.

PELV section – options

General

8.30 For the standard sized bedhead panel, the number of additional facilities that can be accommodated will be limited. The additional facilities of an isolation switch and dual control are described below. It may be necessary for the dual control version to use a deeper box or a larger plate. A typical layout is shown in Figure 9.

Isolation switch

8.31 The isolation switch will provide a convenient means of isolating the PELV section of a bedhead panel and any attachments to:

The more sophisticated type of call system may incorporate automatic fault reporting features.

a. help locate a faulty bedhead panel where several panels are being affected by the fault;

b. take the faulty bedhead panel out of service until maintenance can be arranged.

8.32 The isolating switch should be a multi-pole switch operated by a key (key withdrawable) or a tool. An LED indicator with red lens should be positioned adjacent to the switch to show when the bedhead is isolated.

8.33 It should be possible to isolate any number of bedhead panels in any combination.

Dual control

8.34 Duplication on the panel of the channel selection and volume controls featured on the multifunction handset will make entertainment facilities available (with operation by staff if necessary) to patients who are without a handset or unable to use one.

Another feature of dual controls can be the duplication on the panel of the nurse call button and bedlight control switch in addition to the handset.

9.0 Other call system units

Reset unit

9.1 For areas not requiring a bedhead unit, patient-made calls need to be retained by means of a latch-on device; this is likely to be an electronic module located within a reset unit. The module should be plug-in and easily replaced. The function of the reset unit is to unlatch the electronic module and effect cancellation of the call. A reassurance lamp, typically 1 watt with an orange or amber lens, should be incorporated within the switch used for resetting. The switch will be clearly labelled "Reset". Where appropriate, for example in a dayroom, the reset unit can also incorporate a call push and/or an emergency switch.

9.2 A reset unit may be used to reset calls from a single calling location or multiple calling locations such as a suite of bathrooms/toilets or a multi-bed ward. The number of multiple calling points controlled by a single reset unit should be limited to no more than four.

9.3 Where the reset unit is independently mounted from the call/push, it should be located so that the patient does not operate it unintentionally.

Overdoor/corridor lamps

The material of lamp lenses should be adequately rated so that no deterioration takes place with extended illumination periods. Polycarbonate is a satisfactory material.

9.4 Situated at the entrance to calling locations, the overdoor lamp will indicate to staff responding to a call, the source of that call. For areas such as bedded bays, the lamp should be mounted in the corridor ceiling at the entrance to the bay. Where the calling points are situated along side passages, the overdoor lamp will need to be repeated at the main corridor and at other intermediate places en route if necessary. The overdoor lamp should contain a lamp of at least 2.5 watts rating with a translucent lens.

Nurse station unit (staff base)

9.5 The nurse station or staff base is the administrative and communication centre of the ward. All patient calls will need to be indicated here either with a single group lamp, an individual lamp for each calling point, a combination of both, or by use of other forms of display, for example liquid crystal displays (LCD) or computer visual display units (VDU). One group lamp could be used for the toilets/bathrooms and an individual lamp for each bed call. The lamps may be in the form of high brightness light emitting diodes (LEDs), filament lamps typically 1 watt rated, or other means of display, for example VDUs or LCDs.

9.6 Along with the visual indication of a call, there should be a tone sound (see paragraphs 4.14 and 5.5).

9.7 In areas where the nurse station is responsible for, and local to, a small number of beds only, for example ITU, there may be no need for lamp indication at the nurse station; location of the call can be ascertained from the reassurance lamp at the bed. However, there should always be a tone sound.

9.8 A switch should be provided to attenuate the volume of sound at night. There should be no "OFF" position.

Power/control units

9.9 This unit will be ideally located if mounted centrally within the ward area in an electrical duct or cupboard. Power will be derived from a single phase LV essential supply via a switched fused connection unit nearby (see Figure 10).

9.10 The power/control unit should provide an adequate means of terminating incoming cables. Terminals should be well labelled and of sufficient capacity to accommodate the specified size and quantity of cables and the maximum operational circuit currents.

9.11 The power unit will provide the protective extra-low voltage (PELV) to power the call system, one terminal of the ELV being connected to the protective conductor. Mains transformers should be of Class II construction and comply with BS3535:Part 1:1990. Switch mode power supplies should comply with BS EN 60950:1992. A typical nominal voltage used is 24 volts d.c. With 25 per cent of calling points being energised simultaneously, the voltage on any part of the supply should not be less than that specified by the manufacturer to ensure correct operation of the system. The d.c. output should be stabilised and overload protected against any short or partial short circuits that may cause damage to the cabling or power source.

9.12 The power/control unit may contain the control circuits as necessary. Electronic modules should ideally be plug-in to aid maintenance.

9.13 The power/control unit should be housed in a substantial steel enclosure with an ingress protection rating of at least IP20. A double pole on/off switch should be incorporated to isolate the mains, clearly labelled with its function. The enclosure should be marked externally with the manufacturer's name, address and the telephone number to be used for service. Consideration can also be given to polycarbonate enclosures meeting the same requirements.

Refer to HTM 2011 - 'Emergency electrical services'.
With call systems being powered from the LV essential supply, a power failure is not likely to exceed 15 seconds so the need for a battery/charger equipment to sustain the call system during the power loss is generally considered unnecessary. Should the user, however, wish to:

a. prevent a patient call being lost; and

b. enable a patient call to be established during the rare and short-lived occurrence of a power failure,

a battery/charger equipment will need to be incorporated. Such a decision should take cognisance of the extra costs involved both initially and for subsequent maintenance.

NOTE – (a) and (b) above do not apply to emergency calls.

NOTE – Some modern call systems will be self-sustaining during short-term power loss.

10.0 Transfer of calls

General

10.1 Where staff at a particular nurse station take on the responsibility for the adjacent ward or wards at certain times, for example during the night, it is advisable to incorporate a transfer system whereby any calls from the adjacent ward or wards are annunciated at the duty station.

Transfer switch

10.2 The nurse station at a ward to be transferred will incorporate a switch the operation of which will divert a common signal from any call in the ward to the duty station. A lamp alongside, or incorporated within the switch, will indicate "transfer selected".

Visual signals

10.3 The duty station panel will be equipped with a lamp, LCD or VDU, to indicate that transfer from the "other" ward has been selected. Any calls received from the "other" ward will illuminate a separate lamp (steady for normal calls, flashing for emergency calls) to indicate "Call from Ward ...", or use an LCD or VDU to define the origin of the call.

Audible signals

10.4 Transferred calls, both normal and emergency, should sound the tones appropriately in both the transferred ward and the "duty" ward.

11.0 Speech system

General

11.1 The addition of a speech facility to a nurse call system can save nursing time. It has the advantage that nursing staff at the staff base can ascertain the needs of the patient prior to attending the bed. It eliminates some visits altogether, yet still gives reassurance to the patient.

Nurse station unit (staff base)

11.2 The staff base panel should be fitted with a suitable loudspeaker/microphone arrangement. Identification of the source of the call may be by indicator lamps, liquid crystal displays (LCD) or computer visual display units (VDU). Selection of the speech channel will be by either keyboard or selector switch.

It is recommended that nurse station panels with speech be provided with a telephone type handset in addition, or as an alternative, to the loudspeaker/microphone, for privacy reasons.

Operation

11.3 Selection of the speech channel should enable the nurse to speak to the patient. The patient should not be able to speak to the staff base until a patient call has been established.

11.4 Where the speech system is used to audibly monitor the patient, the patient should be aware that the monitoring is taking place. It should be noted that monitoring of this nature could restrict operation of the remainder of the speech system.

11.5 If the speech system is simplex rather than duplex, the nurse station panel will be fitted with a "push-to-speak" switch.

11.6 It should be possible with a speech system to cancel patient calls from the staff base, but only after communication has been established. Cancelling of emergency calls should not be possible.

Bedhead services unit

11.7 The provision of a speech facility as part of the bedhead services for a patient may take one of the following forms:

a. wall-mounting loudspeaker/microphone. This arrangement is satisfactory in single or twin-bedded wards;

b. a loudspeaker/microphone incorporated within the patient's handset. This arrangement is more user-friendly, being similar to ordinary telephone use. The loudspeaker and microphone should be mounted separately within the handset in positions similar to a telephone handset, see Figure 11. The design features of the non-speech handset should be retained, see Chapter 7.

Where audible monitoring of patients is a requirement, the wall mounting loudspeaker/microphone arrangement will be the most effective. Monitoring will only be practical in single-bed wards, and will normally form part of a separate system.

A separate telephone used for patient-to-nurse speech is not recommended. It will increase the possibility of confusion, especially where a normal telephone facility is also provided.

11.8 It should be possible to insert a speech handset into a non-speech bedhead panel or a non-speech handset into a speech bedhead panel and maintain the use of the basic call system. This will allow maximum flexibility in establishments where both speech and non-speech systems with handsets are in use.

Security of communication

11.9 Where a patient/nurse speech system is a requirement and there will be periods when the staff base is unattended, it is necessary to ensure that communication following a call will be established without delay. This can be achieved by:

a. the nurse responding to the door/corridor indicators and tones and reporting directly to the bed as in a non-speech system;

b. the nurse, on leaving the staff base, picking up a paging receiver; this will direct them to the source of any call made;

c. the nurse responding to the tones or paging receiver and making use of "slave" staff bases placed in strategic positions.

Transfer of speech

11.10 Where speech systems incorporate transfer facilities it will be necessary for the duty nurse to be able to converse with patients in the transferred ward from the duty station. This means that either individual lamps and speech channel selector switches will be duplicated on the duty station panel, or an LCD/VDU will be used to define the origin of the call and assist the selection of speech. Calls from non-speech locations can still be indicated with a single common lamp.

12.0 Nurse presence system

General

12.1 With the greater use of small side wards and recessed bay areas in the modern hospital, the installation of a nurse presence system will allow easier location of staff.

Nurse presence switch

12.2 Each room and bedded bay can be provided with a switch for the nurse to operate as they enter and leave the location. In single rooms, the switch can be part of the bedhead services installation, but more usually it is placed at the entrance of each area so fitted.

It may be possible to install a presence system which will respond automatically to the entry and exit of a nurse. A device can be attached to the nurse's person which will activate a wall-mounted unit; this will initiate the necessary indications at the staff base etc.

Visual signals

12.3 Operation of the switch will illuminate a lamp adjacent to or integral with the switch; additionally, either lamps, LCDs or VDUs will give indication of the whereabouts of the nurse. If required, indication may also be provided in the sister's office to show the location of staff.

Additional tone sounders

12.4 It may be appropriate to install a tone sounder in each area which has a presence switch. The switch when operated will connect the tone sounder so that any patient or emergency call will be heard by the nurse in that location.

The success of a nurse presence system will depend on the discipline exercised in operating the switches for each and every visit.

Speech system

12.5 A nurse presence system lends itself to the addition of a staff-to-staff speech system (intercom). By knowing where nurses are located, the staff base can initiate a speech call to whichever nurse needs to be contacted.

Mimic indicator

12.6 For a large and complex ward layout it may be appropriate to provide at the staff base a mimic indicator engraved with a plan of the ward. Patient call lamps and nurse presence lamps can be positioned on the plan to give a clear picture of call and nurse locations; normally, indication would be to room level.

13.0 Cardiac alarm

General

13.1 If a cardiac alarm system is required it should be initiated by a special switch installed at the bed position. The switch should be boldly marked "Cardiac Alarm". The cardiac call should register at a permanently staffed centre such as the switchboard from where the cardiac response team can be alerted and directed by telephone pocket pager or other means.

Operation

13.2 Operation of the cardiac alarm switch should also initiate the local call system with the accompanying lamps and sounders. The lamps and sounder operation should either be as described for the emergency call (see paragraphs 5.2 to 5.5), or alternatively a separate sounder operation may be used to discriminate the type of call. In the latter case the cardiac call will override any emergency call on the system, which will be stored and reinstated when the cardiac call is cancelled.

13.3 Cancellation of a cardiac alarm will be achieved by returning the alarm switch to normal. Typical switches would be:

a. a pull-on/push-off switch similar to the emergency switch (see paragraph 5.1) with a knob colour other than red or orange;

b. a latching push button with hinged cover.

14.0 Intruder alarm

General

14.1 An intruder alarm is sometimes required to alert staff to an unauthorised person in the ward area. The alarm should be operated by a concealed switch at the staff base, and possibly an additional switch at the far end of the ward/corridor.

Operation

14.2 Operation of the intruder alarm switch should activate the local call system. The lamps and sounder operation should either be as described for the emergency call (see paragraphs 5.2 to 5.5), or alternatively a separate sounder/lamp operation may be required to discriminate the alarm. In the latter case both emergency calls and intruder alarm will be able to operate simultaneously.

14.3 Additional alarm signals may be required at other locations, for example adjacent ward, hospital switchboard, porter's room, security room.

15.0 Attack alarm

General

15.1 In areas such as accident and emergency departments and also psychiatric wards, staff can become subject to attack and it may be appropriate to install a personnel attack alarm system.

Transmitter

15.2 A transmitting device suitable for wearing on a belt or in a breast pocket can be issued to staff. Activation of the device should be by the operation of a switch, or by sharp impact, or by either.

Receiver

15.3 It is essential that the location of the attack is reported and this can be achieved by suitably-placed receiver units wired back to a central indicator situated at a permanently staffed position.

Operation

A multiple mode system might use an infrared signal to report the attack location information and simultaneously a radio signal to raise a general alarm. A failure of one of these signals due to any environmental difficulties will not prevent a response to the alarm.

15.4 An attack alarm system should be designed to be as reliable as possible. Consideration should be given to systems using ultrasonics and/or infrared and/or radio. Where radio signals are used these should be strictly managed and controlled to ensure that the limiting parameters such as signal strength and range as laid down by the manufacturer are not exceeded.

15.5 The body-worn alarm-raising transmitter units can be supplemented by wall-mounting push buttons where additional protection is needed.

16.0 Pocket pagers

General

More information is given in Model Engineering Specification C48 'Radio Paging Systems'.

16.1 Where a nurse may need to move out of earshot of the call tones and still need to respond to a call, a pocket pager can be provided to sound the alarm. The staff base unit will be linked to a transmitter to initiate the signal, the frequency of which should be exclusive to the particular ward.

16.2 A more sophisticated arrangement would be to utilise the type of pocket pager which will indicate also the position from where the call has been made.

Priority of calls

16.3 It is necessary that the pager signals differentiate between types of call and that higher priority calls take precedence. The types of call in order of importance are: cardiac alarm, staff emergency call, patient call.

17.0 Flexible nursing

General

17.1 The pattern of a hospital floor layout may be such as to make practical a flexible nursing arrangement embracing two or more ward areas. Where the degree of patient dependency or bed occupancy varies greatly or regularly, it may be advantageous to have the ability to increase or decrease the number of beds covered by the relative nurse stations. It is probable that computer VDUs will be required to manipulate this information on the system.

18.0 Centralised nursing

General

18.1 Consideration may be given to controlling all nurse-call systems throughout the healthcare establishment from one central point. The potentially large amount of information to be handled, for example:

a. patients' calls, speech and non-speech;

b. staff calls (emergency);

c. nurse presence locations;

d. transferred wards information

would necessitate the use of a visual display unit at the central console linked to VDUs at each nurse station, the whole forming a computerised, software-based network incorporating the necessary speech links between patients and staff and the central console.

18.2 Modern nurse call systems using microprocessor control can accommodate the central control approach if preferred by management. With good organisation and direction of staff from the central control station, there may be opportunities for greater efficiency and economies of staffing.

Call logger

18.3 Systems of this type may incorporate a call logger to provide management information regarding the frequency of calls and response times.

19.0 Entertainment

General

19.1 Provision of entertainment is important for the patient's well-being. A selection of television sound, radio and possibly other channels should be made available as a bedhead service and delivered to the patient via headphones, with channel selection and volume control at the handset or bedhead unit.

19.2 Entertainment sources may include:

a. terrestrial television;

b. satellite television;

c. radio;

d. compact disc player;

e. compact cassette player;

f. video cassette player;

g. cable services.

19.3 Larger healthcare establishments may wish to provide a central console to house equipment for the above facilities and perhaps also a hospital radio station and chapel circuit.

19.4 Technology has brought about dramatic changes in the way hospital multi-channel programme distribution takes place. Use of digital techniques means many high-quality sound channels can be generated from a compact central unit and transferred through a single 4-core data cable to all bedheads, where the signal is decoded. Other places requiring entertainment such as dayrooms or laundries can similarly be served by the same data cable.

A well-designed audio entertainment system should typically have a total harmonic distortion of not more than 2% at 1KHz. Cross-talk between channels should be no more than minus 45dB.

19.5 Traditionally, patients have been provided with just four or six programmes of entertainment and each of these programmes is carried on individual pairs of cables. This constitutes a considerable bulk of cable and very many connections – for example, the termination of six programmes in a bedhead panel means 12 connections in and 12 connections out. The use of a data cable therefore simplifies greatly the installation as a whole and reduces significantly the likelihood of faults developing.

Television sound

19.6 Where television is provided, the means of relaying the TV sound to the patient will depend on circumstances:

a. a single-bed ward may dispense with using the headset and use the TV loudspeaker direct;

Control of the television picture will be by the remote control unit provided with the TV or by the controls on the TV by patients or staff.

b. a multi-bed ward with a traditional system will have the sound output of the TV wired around the bed positions for headphone listening, the loudspeaker being disconnected. Where the sound output is taken from the TV, a suitable isolation/matching transformer will need to be interposed between the TV and the ward circuits;

c. where TV sound channels are generated centrally, all beds in all wards should be served by this means via headsets;

d. careful consideration should be given to allowing the use of loudspeakers direct. Such an arrangement is open to misuse and potential annoyance.

Digital system

19.7 The system shown in Figure 12 is a comprehensive scheme using multiplex techniques to carry considerable audio entertainment information to the patient. The amount of equipment shown here would certainly warrant a console to house it all and to provide a convenient operator workstation for the times when the "hospital radio" is active. A basic scheme should employ the central receiver/encoder and the FM/TV aerials delivering say four radio and four TV sound channels.

This HTM describes the multiplexed form of audio entertainment distribution in preference to the traditionally multicore direct-wired version. While the system detailed has much to offer by way of sound quality, reliability and economics, the traditional system (see Model Engineering Specification C49) may still warrant consideration by managers for the small establishment and/or extensions to existing traditional installations.

19.8 The central receiver/encoder unit is small and compact. It receives signals from all programme sources and encodes the audio onto a screened data cable. The cable specification should be equivalent to British Telecom CW 1370; the overall diameter is approximately 4 mm and the conductors lend themselves to screwless terminations (IDT), so the installation becomes easy and economical.

19.9 Signal integrity is maintained on long lengths of cable by small repeater units which boost and condition the signal approximately every 300 metres. Where the data cable branches off into wards and other areas, an isolator is installed; this ensures that a fault developing in a particular area does not reflect back into the system. This is a significant improvement on a conventionally wired system where a short circuit on a programme pair can seriously affect the whole site.

19.10 Within the ward, the data cable will loop around all beds. The signal is decoded by the bedhead electronics and then amplified to drive the headset, control of programme selection and volume being via the handset.

19.11 In areas such as dayrooms, laundry and workshops, loudspeakers may be required to provide the entertainment. The data cable will connect into a decoder/amplifier unit complete with controls, to drive the loudspeakers. A 24 volt d.c. supply will be required and this can be taken from a nurse-call power unit where convenient.

Television mains and aerial supplies

19.12 Where television sets are installed, the 13A mains socket and aerial outlet for the TV will not normally be installed as part of the bedhead services but will be positioned at a more convenient location, for example at low level on the opposite side of the room.

19.13 The UHF video signals required for each television set will usually be derived from a common aerial installation. Signal-boosting amplifiers and attenuators should be employed to ensure adequate signal strength and balance at each aerial outlet.

20.0 Integrated services

General

20.1 The use of a data cable to carry information to and from the bedhead opens up the possibility of using the data cable for other facilities.

20.2 The latest developments in bedhead services communication use a single data cable to carry nurse call, patient/nurse speech and entertainment throughout large hospital complexes.

Possible new developments

All of these possible developments would have to be carefully evaluated with regard to their effect on other hospital systems, and any security/ safety implications.

20.3 Once installed, the capacity of a data cable is potentially considerable, so expansion of facilities in the ward becomes possible with the appropriate input and output interfaces. Some features that may be developed in the future are:

a. *bed status:* to indicate whether the bed is occupied, vacant, in the course of preparation or out of commission;

b. *patient monitoring:* the output from medical apparatus can be multiplexed onto the line. This may take the form of a simple on/off medical alarm or a constant reporting of varying analogue signals to indicate a changing medical condition;

c. *menu selection:* the patient can select their choice of meal on a special handset;

d. *patient details:* name, address and all relevant personal information can be entered at the bedside;

e. *medication requirements:* a plug-in display unit at the bedhead can display all medical details to the nurse or doctor.

21.0 Types of installation

General

21.1 As far as possible, the design of a bedhead services installation should be ergonomically sound. Facilities that are difficult to use tend to be not used or wrongly used. Good accessibility is important for both nurse and patient.

21.2 Maintenance on some parts of the bedhead services installation may have to be on a regular basis, for example medical gas terminal units. All equipment should be easily accessible for maintenance to minimise downtime and disruption. Where extra cost put into the installation initially can be seen to achieve reduced effort or time, this should be given due consideration.

21.3 In the majority of cases, a nurse will treat the patient from the patient's right-hand side so where practical, the facilities should be positioned on that side. In some cases treatment is required from the patient's left; any movement of bed or furniture to allow this should not result in any of the bedhead services being obscured. In critical cases, provision for treatment from either or both sides is required.

21.4 Provision should be made to prevent the bed or bed attachments damaging the bedhead services equipment while the bed is being moved, raised or lowered. One method of restricting bed movement towards the wall is to provide some means of buffering fixed to wall, bed or floor.

The installation of electrical and medical gas bedhead services should follow at all times the recommendations of:

a. *BS7671:1992, 'Requirements for Electrical Installations' (the IEE Wiring Regulations, 16th edition);*
b. *HTM 2007 – Electrical services: supply and distribution;*
c. *HTM 2022 – Medical gas pipeline systems;*
d. *BS5724:Part 1:1989 – Medical electrical equipment – General requirements for safety.*

21.5 The means of accommodating bedhead services will depend on many factors, such as the number of services, the type of services, the building structure, and whether the installation is for short-, medium- or long-term use in a new or refurbishing situation.

21.6 For new and major refurbishment and where the bedhead services requirements are basic, the installation for both LV and PELV may employ flush boxes and conduits set into the wall structure and connected (usually) into the ceiling void at each bed position.

21.7 Where the number of bedhead services is significant, embracing for example LV, ELV, medical gases and other services, the method described in paragraph 21.6 becomes complex and expensive and the necessary inroads into the building structure that would be required could constitute an unacceptable weakening of the building fabric or, conversely, there would need to be purpose-built ducting designed into the establishment at every bed position.

Trunking

21.8 A horizontal trunking system is a convenient method of housing bedhead services for the following reasons:

a. when surface mounted, wall chases are eliminated;
b. where walls are lightweight partitioning and/or half glazed it may be the only method of housing and supplying services to the bed;

See Figure 13 for a typical horizontal trunking arrangement.

c. all electrical and gas connections can be fed in at one point, usually at one end of the run of trunking and via a vertical length of the same trunking up to the ceiling void or down to the floor void;

d. modifications to equipment panels or changes in position along the trunking length can easily be carried out. This is particularly useful where the type of nursing may change with time;

A well-designed horizontal trunking system should be able to negotiate around corners and wall projections and also "up and over" doorways in a neat manner.

e. accessibility for maintenance and service is convenient. The removal of panels will expose wiring and piping if necessary;

f. the length of horizontal run is unlimited within reason and could embrace the length of several wards.

Where, in refurbishment work, the trunking is required to span such as a window recess, the manufacturer's recommendation on maximum unsupported lengths (if allowed at all) should be adhered to.

21.9 The design of a trunking system should incorporate the following features:

a. access to live parts via the panels should only be possible with the aid of a tool;

b. separate front panels should be provided for each service carried within the trunking, for example ELV, LV, medical gas/vacuum terminals and bedhead luminaires;

c. the front panels should remain rigid under all conditions;

d. segregation between compartments and different services should be maintained throughout the trunking by use of rigid and secure barriers. Where the barriers are metal, they should be electrically bonded to earth;

e. provision should be made for each front panel to be effectively earthed to the trunking or protective conductor. Conducting accessories mounted on the front panels should be effectively electrically bonded.

Vertical units

21.10 Where the building form is such that the use of a horizontal type of trunking is impractical, for example where doors and windows cause tortuous trunking routes, consideration can be given to a vertical unit system. See Figure 14 for a typical arrangement.

Access to a vertical unit can also be from the rear, or from below where the unit reaches to floor level.

21.11 A vertical unit will be designed to serve one bed or in some instances two beds. With services entering at the top, connecting to the above-ceiling services is relatively easy so that the units can be fitted towards the end of the building programme.

Consideration may be given to the use of vertical units that are supplied to site completely wired, tubed and factory tested.

21.12 Should the need arise, a vertical unit can be re-positioned without major building works.

21.13 The flexibility and adaptability of a vertical system should be no less than that of a horizontal trunking system.

21.14 Where a large number of services need to be provided at the bed, a vertical unit arrangement may be the most suitable means of accommodating them.

Plastic enclosures/ducting

21.15 The use of plastic enclosures/ducting and surface cabling for bedhead services installations is not recommended. The stringent requirements of electromagnetic compatibility (EMC) legislation need to be met, and the use of metal installation components enclosing wiring and equipment will contribute significantly to this end. Where the use of plastic enclosure is unavoidable, the equipment contained therein must meet EMC requirements. One technique is to coat the interior with a metallised spray. Refer to HTM 2014 – 'Abatement of electrical interference'.

22.0 Low voltage (LV) supplies

13A sockets

Current discussion on the introduction of a harmonised plug and socket system for Europe is likely to generate public resistance. No long-term advice can be given at this stage. It is essential that the low voltage and extra low voltage be segregated at all times. The routing of LV cables through an ELV compartment (or vice versa) is strictly forbidden (except bedlight relays, see paragraph 8.22).

22.1 At least one twin 13A switched socket-outlet should be installed at each bed position and it is convenient to incorporate the sockets in the same enclosure as the other bedhead services. Where more than one twin 13A socket is required, the bedhead panel will become larger and non-standard if they are combined in a single unit. An alternative is to mount the extra sockets on a separate panel to match the standard bedhead panel and install them independently but in close juxtaposition to allow easy interconnection. Where other bedhead services are also required, consideration should be given to either trunking installations or vertical units. See paragraphs 21.8 to 21.14.

22.2 Within an intensive care unit the number of socket-outlets required may be as many as 24, some of which may need to be unswitched.

22.3 Where sockets are connected to the essential supply, this should be made obvious, preferably by specifying the switch rocker to be red. In some installations it is specified that alternate beds will have their sockets connected to the essential supply.

Other sockets

22.4 30A sockets for X-ray machines have now been supplanted by standard general-purpose 13A socket-outlets, these being adequate for modern equipment. The circuits to these sockets, however, require special features on account of the transient loads. Refer to HTM 2007 – 'Electrical services: supply and distribution'.

Flammable anaesthetic gases such as ether and cyclopropane are very rarely used and the use of cyclopropane is being phased out completely in the UK; ether is no longer available.

22.5 In departments where there may be an accumulation of flammable anaesthetic gases and sparking of electrical connections may present a hazard, sparkless LV sockets with interlocked switch and special plug may be specified depending upon circumstances (safety requirements to BS5733:1979).

22.6 Shaver sockets should be to BS4573:1970 for general ward use or to BS3535:Part 1:1990 in areas where extra isolation/protection is required, for example bathrooms.

23.0 Bedhead luminaire

General

23.1 Most bedhead services installations will make provision for a reading lamp which usually takes one of the following forms:

a. articulated adjustable arm type mounted to the bedhead services panel or to the wall above;

b. fixed arm lamp mounted at high level on the wall. May have sideways movement only;

c. ceiling-mounted downlighter;

d. linear light fitting attached to trunking.

(b) and (c) above will be particularly suited to children's and psychiatric wards.

For recommendations with regard to bed and ward lighting consult the 'CIBSE Hospital and Health Care Building Lighting Guide (LG2)' or BS4533, sections 102.55 and 103.2, whichever is appropriate.

23.2 Where the reading light is specified as being integral with surface trunking, the luminaires should provide the required luminance allowing for the shielding of the patient's head and shoulders. Where such luminaires are installed in trunking along with medical gas pipeline systems, the control of glare and convenience of terminal use requires careful consideration with regard to positioning.

23.3 The mounting of fixed or free-standing luminaires on moveable lockers is discouraged.

Dimming bedhead luminaires

23.4 Where patient inspection is required at night, it is necessary to provide a small amount of light at the bed (typically 5–10 lux) and this can be achieved by dimming the reading luminaire. With a general lighting service (GLS) lamp a satisfactory dim light can be achieved by inserting in series with the lamp a 240V a.c. rated capacitor: 2.2 μF for a 60 watt lamp and 3.0 μF for a 100 watt lamp. See paragraph 8.20.

23.5 The use of compact fluorescent rather than GLS lamps is becoming universal. Dimming of fluorescent lamps is not so simple as with GLS; an electronic dimmer is required plus a lamp with four contacts and an external starter and gear. An alternative is to use a small GLS lamp to provide the reduced illumination, in the same fitting as the main lamp. In either case, extra wiring to the lamp is required.

Your attention is drawn to DoH Safety Action Bulletin No 69 where it is advised that luminaires should only be used for the purposes for which they are designed. Unprotected lamps used for examination purposes where splashes of liquid may occur can result in lamp explosion. Examination luminaires should be to BS4533 Section 103.2, 1986.

Trunking-fitted luminaire

23.6 Some horizontal bedhead services trunking systems can incorporate supplementary ward lighting. Fluorescent light fittings are attached to the trunking either separately or as an integrated section of the trunking design. It is unlikely that this form of illumination is sufficient as the only ward lighting, because the height of the light source will be less than optimum.

24.0 Medical gas pipeline systems

General

24.1 Where medical gas pipeline systems are used, the terminal unit provided should be as indicated in the relevant Health Building Note, Activity Data Sheet, HTM 2022 – 'Medical gas pipeline systems' and BS5682:1987.

24.2 Methods of installation should be to HTM 2022 – 'Medical gas pipeline systems'.

24.3 Where terminal units are integrated with other bedhead services, care must be taken to ensure adequate space for ease of use of medical equipment such as flowmeters, vacuum control units etc.

Bedhead services enclosure

24.4 Medical gas terminals mounted within bedhead services enclosures must be rigidly fixed. The panel hole through which the terminal protrudes should be as small as practical and the panel should be easily removable with the aid of a tool to allow routine maintenance on the terminal.

Bedhead services trunking/vertical unit

24.5 Where medical gas pipelines are accommodated within bedhead services trunking or vertical units, they should provide a convenient means of clipping the pipework at the recommended spacing and throughout its length in both horizontal and vertical runs.

25.0 Telephones

General

25.1 Where a bedside telephone is required, the socket-outlet can be incorporated within the bedhead services wall panel. The facility usually takes one of two forms:

a. an individual standard telephone socket will be fitted at each bed and wired as a separate extension to the hospital exchange. This will allow the simultaneous use of private telephones and/or mobile payphones within the ward;

b. an individual standard telephone socket will be fitted at each bed and wired in parallel to other beds in the ward on a common single circuit to the exchange. A telephone or mobile payphone can be plugged in where required, but only one at a time.

In the interests of electromagnetic compatibility (EMC) and possible adverse interaction with ward communications, it is strongly recommended that the use of portable telephones by patients, staff and visitors in sensitive hospital departments (for example ICUs, theatres etc) is not permitted.

Also refer to HTM 2055 – 'Telecommunications (telephone exchanges)'.

Isolation ward

25.2 For patients confined within an isolation ward, the provision of a telephone for the patient and people outside the ward is a convenient means of communication. Such a telephone link should comprise two identical single-button telephones plus a small power supply. Operation of the push button should sound a buzzer on both telephones. The alternative of a loudspeaker type intercom may be required if the patients are incapacitated.

26.0 Electromagnetic compatibility

General

Refer to HTM 2014 – 'Abatement of electrical interference'.

26.1 The sensitivity of electronic components is such that protection against electrostatic and electromagnetic interference becomes of paramount importance.

26.2 Electromagnetic compatibility (EMC) is defined as capability of electronic equipment or systems to be operated with a defined margin of safety, in the intended operational environment, at designed levels of efficiency, without degradation due to interference.

26.3 All electrical units should meet the requirements of the EC Directive 89/336/EEC (the Electromagnetic Compatibility Regulations 1992) for both emissions and immunity.

Electrostatic discharge immunity

The static voltages at the bed area should not exceed 7kV. One method used to achieve this is to use floor coverings and bed tyres made with dissipative material.

26.4 The presence of electrostatic discharges between dissimilar materials is well known. The use of artificial fibres in clothing and bedding materials can produce a very high static build-up.

26.5 The bedhead services units, including the handsets, should meet the electrostatic discharge tests specified in the appropriate immunity standard, that is, 4kV contact discharge, 8kV air discharge.

26.6 It is recommended that provision is made on the bedhead services panel for one earthing point to which the bedframe can be attached.

Other publications in this series

(Given below are details of all Health Technical Memoranda available from HMSO. HTMs marked (*) are currently being revised, those marked (†) are out of print. Some HTMs in preparation at the time of publication of this HTM are also listed.)

1 Anti-static precautions: rubber, plastics and fabrics†
2 Anti-static precautions: flooring in anaesthetising areas (and data processing rooms), 1977.
3 –
4 –
5 Steam boiler plant instrumentation†
6 Protection of condensate systems: filming amines†
2007 Electrical services: supply and distribution, 1993.
8 –
9 Pneumatic conveyor systems*
2010 Sterilizers, 1994.
2011 Emergency electrical services, 1993.
12 –
13 –
2014 Abatement of electrical interference, 1993.
16 –
17 Health building engineering installations: commissioning and associated activities, 1978.
18 Facsimile telegraphy: possible applications in DGHs†
19 Facsimile telegraphy: the transmission of pathology reports within a hospital – a case study†
2020 Electrical safety code for low voltage systems, 1993.
Pack of rulebooks, logbooks, permits etc, 1994.
2021 Electrical safety code for high voltage systems, 1994.
Pack of rulebooks, logbooks, permits etc, 1994.
2022 Medical gas pipeline systems, 1994.
2023 Access and accommodation for engineering services*
2025 Ventilation in healthcare premises, 1994.
26 Commissioning of oil, gas and dual fired boilers: with notes on design, operation and maintenance†
27 Hot and cold water supply, storage and mains services*
28 to 39 –
2040 The control of legionellae in healthcare premises – a code of practice, 1993.
41 to 49 –
2050 Risk assessment in the NHS estate, 1994.
51 to 53 –
2055 Telecommunications (telephone exchanges), 1994.

Component Data Base (HTMs 54 to 80)

54.1 User manual, 1993.
55 Windows, 1989.
56 Partitions, 1989.
57 Internal glazing, 1994.
58 Internal doorsets, 1989.
59 Ironmongery†
60 Ceilings, 1989.
61 Flooring*
62 Demountable storage systems, 1989.
63 Fitted storage systems, 1989.
64 Sanitary assemblies*
65 Health signs*
66 Cubicle curtain track, 1989.
67 Laboratory fitting-out system, 1993.
68 Ducts and panel assemblies, 1993.
69 Protection, 1993.
70 Fixings, 1993.
71 Materials management modular system*
72 to 80 –

Firecode

81 Firecode: fire precautions in new hospitals*
81 Supp 1, 1993.
82 Firecode: alarm and detection systems, 1989.
83 Fire safety in healthcare premises: general fire precautions, 1994.
85 Firecode: fire precautions in existing hospitals, 1994.
86 Firecode: fire risk assessment in hospitals, 1994.
87 Firecode: textiles and furniture, 1993.
88 Fire safety in health care premises: guide to fire precautions in NHS housing in the community for mentally handicapped/ill people, 1986.

New HTMs in preparation

2024 Lifts
2030 Washers for sterile production

Health Technical Memoranda published by HMSO can be purchased from HMSO bookshops in London (post orders to PO Box 276, SW8 5DT), Edinburgh, Belfast, Manchester, Birmingham and Bristol, or through good booksellers. HMSO provide a copy service for publications which are out of print; and a standing order service.

Enquiries about Health Technical Memoranda (but not orders) should be addressed to: NHS Estates, Department of Health, Marketing Unit, 1 Trevelyan Square, Boar Lane, Leeds LS1 6AE.

About NHS Estates

NHS Estates is an Executive Agency of the Department of Health and is involved with all aspects of health estate management, development and maintenance. The Agency has a dynamic fund of knowledge which it has acquired during 30 years of working in the field. Using this knowledge NHS Estates has developed products which are unique in range and depth. These are described below. NHS Estates also makes its experience available to the field through its consultancy services.

Enquiries about NHS Estates should be addressed to:
NHS Estates, Marketing Unit, Department of Health,
1 Trevelyan Square, Boar Lane, Leeds LS1 6AE.
Telephone 0113 254 7000.

Some other NHS Estates products

Activity DataBase – a computerised system for defining the activities which have to be accommodated in spaces within health buildings. *NHS Estates*

Design Guides – complementary to Health Building Notes, Design Guides provide advice for planners and designers about subjects not appropriate to the Health Building Notes series. *HMSO*

Estatecode – user manual for managing a health estate. Includes a recommended methodology for property appraisal and provides a basis for integration of the estate into corporate business planning. *HMSO*

Concode – outlines proven methods of selecting contracts and commissioning consultants. Reflects official policy on contract procedures. *HMSO*

Works Information Management System – a computerised information system for estate management tasks, enabling tangible assets to be put into the context of servicing requirements. *NHS Estates*

Health Building Notes – advice for project teams procuring new buildings and adapting or extending existing buildings. *HMSO*

Health Guidance Notes – an occasional series of publications which respond to changes in Department of Health policy or reflect changing NHS operational management. Each deals with a specific topic and is complementary to a related Health Technical Memorandum. *HMSO*

Health Facilities Notes – debate current and topical issues of concern across all areas of healthcare provision. *HMSO*

Encode – shows how to plan and implement a policy of energy efficiency in a building. *HMSO*

Firecode – for policy, technical guidance and specialist aspects of fire precautions. *HMSO*

Capital Investment Manual Database – software support for managing the capital programme. Compatible with Capital Investment Manual. *NHS Estates*

Model Engineering Specifications – comprehensive advice used in briefing consultants, contractors and suppliers of healthcare engineering services to meet Departmental policy and best practice guidance. *NHS Estates*

Quarterly Briefing – gives a regular overview on the construction industry and an outlook on how this may affect building projects in the health sector, in particular the impact on business prices. Also provides information on new and revised cost allowances for health buildings. Published four times a year; available on subscription direct from NHS Estates. *NHS Estates*

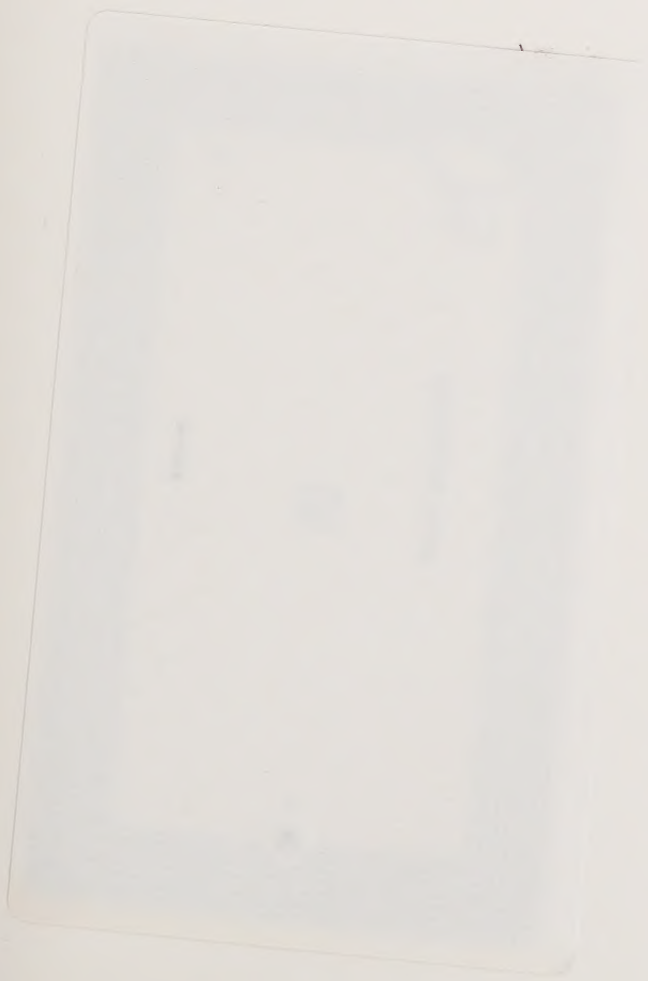
Items noted "HMSO" can be purchased from HMSO Bookshops in London (post orders to PO Box 276, SW8 5DT), Edinburgh, Belfast, Manchester, Birmingham and Bristol or through good booksellers.

NHS Estates consultancy service

Designed to meet a range of needs from advice on the oversight of estates management functions to a much fuller collaboration for particularly innovative or exemplary projects.

Enquiries should be addressed to: NHS Estates Consultancy Service (address as above).

Printed in the United Kingdom for HMSO
Dd 300363 C13 2/95



Department of Health

Scottish Office

Welsh Office

Department of Health
and Social Services
Northern Ireland

Health Technical Memorandum 2015 focuses on the legal, mandatory and functional requirements, design applications, maintenance and operation of systems. These include electrical and communication systems and medical gas terminal units required at the bedhead and at other patient locations in all types of healthcare premises.

This volume – 'Design considerations' – highlights the overall requirements and considerations that should be applied to the design up to the contract document.

This HTM supersedes HTM 15 – 'Patient/nurse call systems' (first published by the DHSS in 1966) and DHSS Engineering Data Sheet DU 3 published in January 1986.

HMSO

Published by HMSO and available from:

HMSO Publications Centre
(Mail, fax and telephone orders only)
PO Box 276, London SW8 5DT
Telephone orders 0171 873 9090
General enquiries 0171 873 0011
(queuing system in operation for both numbers)
Fax orders 0171 873 8200

HMSO Bookshops
49 High Holborn, London WC1V 6HB
(counter service only)
0171 873 0011 Fax 0171 831 1326
68-69 Bull Street, Birmingham B4 6AD
0121 236 9696 Fax 0121 236 9699
33 Wine Street, Bristol BS1 2BQ
0117 926 4306 Fax 0117 929 4515
9-21 Princess Street, Manchester M60 8AS
0161 834 7201 Fax 0161 833 0634
16 Arthur Street, Belfast BT1 4GD
01232 238451 Fax 01232 235401
71 Lothian Road, Edinburgh EH3 9AZ
0131 228 4181 Fax 0131 229 2734

HMSO's Accredited Agents
(see Yellow Pages)

and through good booksellers

HMSO M

ISBN 0-11-321771-4

9 780113 217717

Health Technical Memorandum 2015

Bedhead services

NHS Estates

HMSO